Survey Finds Minis Claim New Territory

By Esther Surden
CW Staff

NEWTON, Mass. — While minicomputers are not yet ready to take over the mainframes' world, more and more are infiltrating the large systems' territory.

Many large users have turned to minis as a solution to at least part of their DP workload, a recent CW survey found.

More than 220 users, representing about 800 minicomputers from 35 different vendors, responded [CW, July 4].

About one third of those who participated in the survey had multiple minicomputers in their shops or in remote company locations. About one fourth either used their minis in conjunction with a mainframe or along with time-sharing on a large system.

While the use of minis continues to spread to both large and small companies, software support remains the bane of the mini user's existence with over a quarter of those responding to the survey calling their vendor's support poor. Even many of those giving their vendors good ratings pointed out deficiencies in support. (See related story on Page 7).

Users did not single out any particular vendor for their criticism, and critical arrows hit large and small vendors alike. Users who were disturbed about software support were very vocal in making this known. As one sophisticated user with approximately 85 minicomputers under his control noted, "mini vendors sell hardware, there is not

(Continued on Page 6)

CW Special Report on Minicomputers and Small Business Systems follows Page 34

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
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NEWSPAPER

AUG 29 77

Groups Explore Change Needed In Federal DP

By Edith Holmes
CW Staff

WASHINGTON, D.C. — A new federal agency is needed to consolidate government computer and communications procurement and management under one roof, according to several recommendations received by the President's reorganization team in the Office of Management and Budget (OMB).

This view, expressed by several computer industry associations and active individuals, contrasts with the view held by vendors such as IBM and Computer Sciences Corp. (CSC) and Rep. Jack Brooks (D-Texas) who have urged that federal oversight of agencies' computer and communications operations remain essentially what it has been for the last 12 years.

Oversight Divided

The existing structure, established in 1965 by the Brooks Act (P.L. 89-306), split DP oversight tasks among OMB, which is responsible for central and fiscal management review, the General Services Administration (GSA), which handles the acquisition of DP and communications equipment for most federal agencies, and the Department of Commerce, which houses in the National Bureau of Standards (NBS) the Institute for Computer Sciences and Technology — the standards-setting body in this field.

OMB has received "several hundred responses" as a result of its solicitation for comments from anyone interested in the management of federal DP resources [CW, July 11], a spokesman for the reorganization project said.

For the time being, comments from the federal agencies themselves are being treated as "advice to the President" and so are unavailable to the press and public, he added.

(Continued on Page 4)

10 Attacks Within a Year

DP Center Bombings Plague Italy

By E. Drake Lundell Jr.
CW Staff

MILAN, Italy — An armed terrorist group here has singled out corporate and state computer centers as targets for attack, bombing at least 10 such centers throughout Italy during the past 10 months.

The group, which has attacked only computer centers to date, calls itself the Unita Combattenti Communiste, which translates to the "Communist Combat Unit." In the past 10 months it has attacked three manufacturing companies, three chemical firms, two universities, an oil company and a local government office.

And while estimates are not available for all of the bombings at this time, the damage amounted to well over $5 million for the five cases where such figures were available — or a little over $1 million in damages per bombing.

This wave of political computer center bombings is apparently "unprecedented," according to Donn B. Parker, a computer crime expert from SRI International. Parker noted that in the past 10 months there have been more such cases in Italy than have occurred in the U.S. in the almost 20 years he has been keeping statistics on the subject.

A general theme in the communiques left by the groups after each bombing is that computers are "instruments of the capitalistic system" and therefore must be destroyed.

The attacks appear to be well coordinated and to be the work of a group that has "cells" or "cadres" in different parts of the country, according to European security forces.

The attacks are all run in a military style, they noted, and the comuniques issued after the bombings use military phrasing.

In each case, the attacks have taken a minimum amount of time with the terrorists apparently knowing exactly where to go within the computer center to do the maximum amount of damage, they added.

The group's first attack took place on May 26, 1976 in the public terminal room of the tax collection agency for the local government here.

In this case a large group — 15 men — entered the room carrying handguns and submachine guns. They threw 10 Molotov cocktails, eight of which ex-

(Continued on Page 5)

Court Orders New Trial For Greyhound vs. IBM

By Molly Upton
CW Staff

SAN FRANCISCO — Greyhound Computer Corp. will have a second chance to prove that IBM monopolized the computer leasing industry.

An appeals court here, after remaining silent for more than three years, overturned an earlier decision in the case that favored IBM and it ordered the matter retried.

The Greyhound case, filed in late 1969, was the first antitrust suit against IBM to go to trial, but the charges against IBM were dismissed by Judge Walter E. Craig in July 1972 before IBM presented its defense.

Craig ruled that the computer leasing company did not present enough evidence to support its charges that IBM monopolized the leasing market by restricting sales of its computer equipment.

Craig therefore entered a "directed verdict" in favor of IBM, even before that firm presented its defense before the six-person jury.

Greyhound appealed that decision in April 1974 and has been waiting since then for the decision of the Ninth Circuit Court of Appeals, which has now overturned Craig's ruling.

The appeals court, in a decision writ-

(Continued on Page 2)

N.Y. Halts Software Tax

By Molly Upton
CW Staff

ALBANY, N.Y. — New York State Tax Commissioner Thomas A. Lynch last week declared a moratorium on audits and assessments on DP software and services pending further consideration of the matter.

Following a hearing on taxation of the DP industry attended by a standing-room-only crowd of over 50 persons, Lynch and counselors Peter Crotty and Arnold Glass indicated they would refer the issue to the full three-man tax commission for possible formulation of new regulations.

At the end of the hearing, Lynch stated that the commission will consider the matter at its next meeting in October.

Lynch instructed those present to remit to the state any sales taxes they had already collected from customers. However, he did not indicate what course of action DP firms should take in the interim, observed Sandy Goldberg of Roberts & Holland, attorney for the Association of Data Processing Service Organizations (Adapso). Goldberg surmised one should continue collecting the taxes.

(Continued on Page 6)

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IBM Antitrust Suits Boiling Again

By Molly Upton
CW Staff

SAN FRANCISCO – The recent Ninth Circuit Court ruling throwing the Greyhound Computer Corp. vs. IBM antitrust case back into the courts adds one more ingredient to what may prove to be a boiling pot for IBM.

IBM has Cravath, Swaine & Moore attorneys actively engaged in the U.S. trial and hanging on the line in the event that the case of California Computer Products, Inc. vs. IBM comes back to life as Greyhound did.

As in the Greyhound case, IBM received a directed verdict in the Calcomp suit against it.

Meanwhile, IBM is already busy defending itself on the West Coast in the recently opened trial of a suit filed by Forro Precision, Inc.

This, even before the scheduled January opening of the Memorex vs. IBM antitrust case.

The law firm retained by IBM for the Memorex action, O'Melveny & Myers of Los Angeles, is also handling its defense against Forro.

Forro, a disk drive components manufacturer, file the suit in 1974 after IBM had the instrument maker's plant searched as part of its research into alleged thefts of disk drive trade secrets by former employees of IBM's San Jose facility.

$36 Million Sought

Forro seeks $36 million in treble damages on antitrust grounds and also charges IBM with seizing its records and trying to put it out of business.

IBM's $25-million counterclaim alleging unlawful market presence and misappropriation of trade secrets is also part of the jury trial which is expected to last until October.

Speaking for IBM, attorney Henry C. Thumann said, "Far from showing any damage to Forro from the activities of IBM the evidence in this case is going to show unjust, unlawful profits enjoyed by Forro Precision through its exploitation of IBM technology and IBM specifications, which it knew [were] obtained unlawfully in violation of the rights of IBM."

Forro attorney Joseph A. Alioto said evidence will show "the effort made by IBM to infiltrate Forro and find out as much information as they could about Forro and, by reason of that information, about IBM's peripheral competitors, information they knew they could not otherwise get in the marketplace itself."

Alioto charged that in 1970 IBM hired a man to "get into Forro and find out what Forro had, find out what its production was, find out who its customers were, prices and things like that."

Greyhound vs. IBM, Act 2

(Continued from Page 1)

ten by Justices Browning, Wallace and Moore (who normally sits on the Second District Appeals Court in New York), said the trial should have been allowed to run its course because the jury could have found that leasing general-purpose computers for commercial applications could have constituted a relevant market for antitrust purposes.

The decision also found evidence in the record "from which the jury could reasonbly infer that IBM possessed monopoly power in the leasing of general-purpose commercial computers."

The court, the ruling continued, is "bound to view the evidence in the light most favorable to [Greyhound] and to give it the benefit of all inferences which the evidence fairly supports, even though contrary inferences might reasonably be drawn.

"The jury [also] could have concluded that IBM maintained its monopoly power in the leasing of general-purpose computers in part by practices that unnecessarily, even deliberately, excluded leasing companies from an opportunity to compete," the ruling said.

Further, "Greyhound offered direct evidence to prove that the conduct complained of did occur and that it restricted the competition of leasing companies in the leasing market, in which IBM possessed monopoly power," the appeals court stated.

"This was sufficient to establish the prima facie case. Greyhound wasn't required to prove the source of IBM's power to do what Greyhound's evidence indicated IBM in fact did," the court ruled.

An IBM spokesman contacted last week stated: "We are confident that given the opportunity to present our case we will prevail on the merits."

IBM Strategy

Greyhound contended IBM sought to make the purchase of computer equipment by lessors economically unattractive through the use of the fixed-term plan, discontinuance of technological discounts, increase of the lease/purchase ratio and unbundling.

The appeals court found Greyhound failed to prove the fixed term plan was not a reasonable response to competition. But it indicated the jury could have found the other actions either intentionally or effectively anticompetitive.

Original Decision

In the original decision, Judge Craig had ruled the evidence was "insufficient" to establish a relevant market and IBM's share of the market.

In addition "the evidence was insufficient to establish IBM's control of a market."

Furthermore, "the share of any market IBM holds has been achieved as a result of superior skill, foresight and industry," Craig had ruled.

According to the original ruling, "IBM's activity of which Greyhound complains was a competitive response to economic factors over which IBM had no control; and "Greyhound's damages were 'purely speculative.' "

The appeals court also took time to refute certain of IBM's arguments.

The appeals court let stand Judge Craig's finding that IBM had not breached an obligation to provide services to Greyhound's lessees who were first users of the machines and it ordered the rest of the case back to trial.

On the Inside This Week

NEWS

It Could Happen Here 5
Mini Users Found Critical of Software Support 7
System Helping AMC 'Americanize' Engine 8
DP Audit Role Seen Needed Early in Projects 11
Data Control Seen as Basic Management Goal 14
Word-Analysis System Examines Marital Flaws 15

EDITORIAL

Editorial: First Things First 16
Human Connection: Automated Physician Fantasy . . . 17
Taylor Report: Ideas Reduce Overbooking Damage . . 17
Letter to Lord From Rigo: 'Sorry, No Deal' 18

SOFTWARE & SERVICES

'Average' DOS Site Has 135 19
ACM Group Seeks Curriculum Reaction 20
Project Control Still Seen as Vital Application 22

COMMUNICATIONS

Networks Need User/Carrier Confidence 23
Hundreds of Terminals Operating On Datapac 24
Penril Has LSI Modem to Replace Bell 201s 26

SYSTEMS & PERIPHERALS

One-Step System Processes Remittances 27
3M Introduces Four Disk Packs 30

MINIWORLD

Minis Facilitate Prescription Control 31
Definitions Sort Out Chip Memory Functions 32
Bar-Encoded Labels Simplify Librarians' Duties 33
Orderly Selection Route Ensures Best Decision 34

MICROCOMPUTING

Wintek Hands-On Course To Use Take-Home Micro . 35
Micro Stores 17K Bytes 38

COMPUTER INDUSTRY

IBM Could Force Others Out: Trial 37
Telecommunications Ripe For More Minis 37
Army Cancels CDC System as Interim Standard 38
Panel Sees Eventual Standards For Graphics 40
Floppy Media Sales Seen Climbing 40%/Year 41
Telecommunications Market Seen Unique Area 42
Growth, Profit Goals Led Adds to OEM Market 43
Analysts Bullish on DP Stocks Outlook for Year 44

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7	**General Electric**
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9	**Standard Oil (Calif.)**
10	**Texaco**
11	**Gulf Oil**
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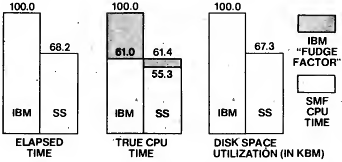

A fourteenth name on the list is going through the SyncSort testing phase right now, and any day we hope to be able to announce that we have 14 out of 15.

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Federal DP Needs Consolidation, Observers Say

(Continued from Page 1)

The request for public comments on the issues OMB has identified in the federal DP and communications areas is one of the first steps in the reorganization of federal data processing. OMB hopes to give its final recommendations to President Carter within 10 to 12 months, the spokesman stated.

Afips Panel

Representing its member associations, the American Federation of Information Processing Societies (Afips) set up a panel to develop recommendations. That panel determined that while OMB "should continue to provide government-wide enforcement" through fiscal control, an independent agency should be established whose "sole mission" would be responsibility for all federal DP and communications procurement and management.

Afips envisions such an agency as having authority over all other agencies in management policy, procurement, technical support and standards development and implementation.

The agency, which would thus consolidate the functions now performed by OMB, GSA and NBS under the Brooks act, would also perform long-range planning of DP and communications operations as part of the regular budget cycle, according to the Afips scheme. Agencies would undergo "mandatory periodical total system performance evaluation and analysis" by this organization as well.

The independent body would maintain an inventory of well-documented software packages with information on their performance and provide technical consultants to other agencies, Afips stated.

Finally, the agency would make recommendations to the Civil Service commission regarding adequate job categorization. A particular emphasis would be placed on software personnel and the provision of adequate continuing education to enable federal personnel to keep abreast of technological change, Afips said.

The Computer & Communications Industry Association (CCIA) would consolidate the present Brooks Act functions under one organization, too, but that organization would have a different focus. The CCIA would place GSA and NBS within OMB, strengthen OMB by providing it with "a realistic five- to 10-year long-range planning capability," and elevate the management and budget agency to a cabinet-level position.

"All of the centralized procurement functions now scattered among GSA, OMB and NBS would logically fall within the scope of this single agency as ADP is, afterall, a management tool," the association wrote to OMB. It suggested that the "single agency" might be called the "Department of Planning and Management."

"Any reorganization in the federal ADP arena must begin with a renewed commitment toward standardization of ADP equipment," the CCIA added.

Grosch's Response

Speaking as "a Brooks Bill veteran" and as "a computer pioneer" rather than as president of the Association for Computing Machinery (ACM) or as a member of the Afips panel, Herbert R.J. Grosch recommended that any central authority the reorganization project decides to put together "must be predominantly technical."

These people need not be "chip designers or laser physicists," Grosch wrote, but if they are unable to easily cope with extreme technological innovation "used against them as a weapon by IBM and the other suppliers and by the fancier agencies," the organization "will be outflanked daily."

While the Commerce Department might be a good temporary home for such a body, Grosch would like to see it become independent eventually — along the lines of the central computer agency in Great Britain or the Swedish statskontoret.

"There is absolutely no hope for rapid or significant progress in DP standards in the U.S. until Cbema [the Computer and Business Equipment Manufacturer's Association] is taken out of the circuit," Grosch said, noting that Ansi's X3 committee is currently "operated" by the association.

While Grosch and Cbema clearly clash over this issue, they are in agreement in wanting to see the federal agencies' procurement of DP and communications equipment speeded up.

Need for Clarity

Cbema and several vendors expressed the need for clearer regulations in the area of equipment acquisition. IBM offered to share its planning and management techniques.

The computer industy leader also told OMB it "supports the separation of ADP policy and procurement responsibilities which currently exists between OMB and GSA."

IBM further stated its belief that the DP and communications equipment the federal government now has is behind the state-of-the-art and behind that of most other users.

Rep. Brooks interprets federal agency complaints that procurement takes too long as efforts to undermine the Brooks Act. In a memo to OMB, he expressed his belief in the system as established by the act, suggesting that the oversight agencies — OMB, GSA and Commerce — are at fault for not enforcing it.

"Without a firm commitment by OMB, GSA and Commerce to eliminate the historical barriers between these agencies and without the establishment of effective centralized ADP management in each agency, little hope exists that the government will be able to effectively manage and control its ADP resources," Brooks wrote.

To strengthen centralized DP management in the executive agencies as well as the oversight roles of OMB, GSA and Commerce, the congressman suggested greater support and funding be given to the federal government's software conversion program with a view toward limiting interim system upgrades.

The reorganization project is currently evaluating the comments submitted to it. In October, task forces will be organized and assigned to study such areas as procurement, standards and career development for DP and communications, the spokesman said.

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Rash of Bombings Plagues DP Installations in Italy

(Continued from Page 1)

ploded, destroying eight of the 70 IBM 2740 terminals installed in the area. The center was down for a day and a half after the attack.

Then on Oct. 13, 1976, the second commando attack took place. This time, plastic explosives destroyed an unidentified computer system at De Angeli, a pharmaceutical company here.

A more documented action took place on Dec. 19, 1976 at Data-Montedison, an in-house service bureau for the huge Montedison conglomerate.

In this case, three men and one woman, carrying a large package approached the plant's security guards and told them they wanted to leave a present for a coworker.

The guards opened the gate to the plant, at which time the terrorists overpowered them and forced them to open the computer center. The terrorists went immediately to the communications controller in the center, doused it with gasoline and ignited it.

Immediately after this attack in Milan, three armed men in Rome — 500 to 600 miles away — forced their way into a private radio station and forced the radio personnel to read a statement defending the bombing. This led security personnel here to the conclusion that they were dealing with a nationwide organization.

Steel Plant

The next assault took place on Jan. 17, 1977, when the group planted a bomb above an IBM 370/135 computer at Sias, a steel manufacturing company here. The bomb broke through a bulletproof glass panel and did about $30,000 in damage to the center.

Immediately after this bombing the Sias DP manager was given permission to buy fireproof safes for his tapes — a long-standing request that had been previously denied by management.

The next case came on April 15, when a production control system was destroyed at Liquichimica, a petrochemical company in Saline Ioniche, Calabria. The four attackers again carried hand and submachine guns and doused the computer with gasoline, resulting in damage of about $1 milllion.

University Next

Then in April 21, two masked men and a woman forced their way into an intelligent terminal center at the University of Bocconí here and used explosives to blow up the center. The communique from this bombing, left in San Marco Church here, said the university was a center for the training of high-level executives "that will join the capitalistic forces" in the future.

The bombings prove the small teams of guerillas can attack the capitalists, the communique added.

The next major guerrilla move came on June 10, when three women broke into the computer center at the University of Rome and destroyed a Univac 1110 worth more than $4 million.

The women were armed with submachine guns and hand guns. They held the guards hostage while they evacuated the computer center, then covered the CPU with gasoline and ignited it. The action seemed well timed to catch the evening news and was prominently featured on Italian TV that night.

Three Other Attacks

Security personnel in Europe said there were at least three other attacks claimed by the group, but they would not publicly identify the companies involved except to say that one was an oil company and the other two involved manufacturing companies.

In addition to those attacks on computer centers, IBM and Honeywell Information Systems offices in Italy have also been the subject of terrorist attacks, the security men indicated.

'It Could Happen Here'

MENLO PARK, Calif. — Terrorist attacks on computer centers like those now taking place in Italy "could happen here," a noted computer crime consultant here indicated last week.

Donn Parker, a researcher with SRI Inc. (formerly Stanford Research Institute), warned that the U.S. Department of Justice has indicated there may be a step-up of terrorist activity in this country and indicated such activity could be directed toward computer centers.

Parker, who has studied computer crime for almost two decades, said "we have no history of any related attacks of this size" anywhere in the world.

In the late 1960s, he said, computer centers were targets of several bombings related to the antiwar movement, but since 1971 there have been almost no such attacks.

The Italian computer center attacks show we are "entering the era of high-technology terrorism," according to Wallace S. Bruschweiler, director of international operations for Data Security Holding, Inc.

And, he admitted ruefully, there is little that can be done to stop attacks like the 10 that have recently taken place in Italy.

While a computer center can, and should, set up fairly rigid access controls it is difficult to stop terrorists armed with submachine guns from pushing their way in, he indicated.

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Minis Moving Into Large Systems Domain

(Continued from Page 1)

much concern for software".

An overwhelming majority of those who replied used their small systems for multiple applications, and most of the respondees preferred to do their own programming rather than get a turnkey system or outside help.

Selection Criteria

Price/performance ranked as the No. 1 criterion users gave for choosing their particular mini system, while software capability and vendor reputation were close behind. Many readers gave a combination of these factors as the reason for choosing their systems, while others mentioned vendor proximity, the vendor's ability to provide remote maintenance and good field service organization or a low bid.

Over 90% of the users rated their hardware maintenance service either good or excellent, and a majority called their maintenance service excellent. Several readers said they did their own maintenance.

As to what users will do when they outgrow their present systems, many stated they either did not expect to outgrow their systems or that an upgrade (adding more disk, another terminal, more memory) would take care of their growing pains for the foreseeable future.

Over half of those responding indicated that their next course of action would be to get a larger mini when their present system becomes overloaded. The second most popular answer was to "offload the system with another small system."

Purchase Decision

The area of the most diversity among those who returned the survey was the matter of who makes the final purchasing decision with respect to minicomputers. Although a central DP department was cited most often as having the final word on system purchases, many users said that a combination of the end-user department, central purchasing department and central DP department came up with the final go-ahead.

Some smaller users noted that top management, managing partners or the president had the final word, while some larger users followed a more complex and well-defined procedure.

In general, users seemed pleased with their small systems, as evidenced by their willingness to stay with minis when their present systems were "outgrown." Very few users chose the alternative of growing into a mainframe when they looked to the future.

Although most users were not as vocal as a coordinator of computer services of a junior college in Massachusetts who said "minis will eventually replace almost all mainframes," many did express their commitment to the small systems in various ways.

Minis 'Underated'

An IBM 5100 user said "minis are underrated as a good solution to the problems of smaller businesses," and a DP manager for a Seattle company noted "transaction-oriented minis are great. They give users control of their systems and the price/performance is outstanding."

Of all those who took the time to reply to the survey there was only one detractor. "We feel distributed processing is a big mistake," this user of several mnis noted. The firm said that when its distributed system is outgrown, the firm will "go on-line to a mainframe."

People with "low education, low literacy and low management skills at remote locations cannot run a small terminal, much less a small computer system," this user added.

N.Y. Halts Software Tax

(Continued from Page 1)

The state will continue to mail out "desk audits," or questionnaries, according to observers, but will cease sending auditors for on-site work.

Presentations by several industry members succeeded in removing the mystique from data processing by succinctly outlining the various aspects of programming, systems analysis and contract programming and explaining the differences and similarities between time-sharing and batch services, observers indicated.

In addition, both David Campbell, vice-president of the Computer Task Group, a Buffalo firm, and Rhoda Minowitz of Queens Data Processing described their plights caused by the assessment of taxes for past years.

Borders on 'Immoral'

Commissioner Lynch agreed with Campbell that his situation, in which the assessment exceeds the net value of his firm, "borders on the immoral."

Miniowitz indicated a $90,000 assessment rendered her unable to sell her business. "How can you buy a business with a $90,000 liability?" she asked.

The Data Processing Management Association (DPMA) was represented by Robert Sherin, president of Nova Computing Services, Inc., and speakers for Adapso were attorney Goldberg, Al Eisenstat; general counsel of Tvmshare, Inc. and David Campbell.

Not Quite Right

Jerry Dreyer, executive vice-president of Adapso, called the meeting "excellent" and observed that the moratorium may indicate the state feels something is not quite right with its taxing policies.

The state representatives seemed "very sympathetic to the problem of retroactivity." They also indicated a tendency to view DP as producing a personal service rather than a tangible piece of property, Dreyer observed.

Adapso will once again place high priority on efforts to draft model legislation concerning taxing DP services and software, according to Dreyer.

Cannot Escape

He also said he is not so naive as to believe the industry can escape taxation completely. However, he said what is needed is equitable taxation — the DP industry should be treated in the same manner as other fields, such as accounting.

After the meeting, Lynch invited Adepso representatives to return within a month for another meeting, Dreyer said.

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In Survey of 220 Sites

Mini Users Found Critical of Software Support

By Esther Surden
CW Staff

NEWTON, Mass. — Users responding to a recent CW survey had a lot to say about the software support available for their minicomputes — most of it critical.

The survey of over 220 users representing over 800 minicomputers revealed that software support for minis is at best spotty and that levels of support vary from location to location.

Although 75% of users rated their software support as either good or excellent, many of those who called their vendors' support good pointed to problems yet to be solved.

A common complaint was that the vendor had no local software support or the support available was spread too thin. Poorly trained software personnel and software. that was delivered full of bugs were also frequently cited.

No particuar vendor was the target of the criticism. Users praised or complained about large and small vendors alike, including those noted for their user support reputation.

Digital Equipment Corp. came in for its share of criticism from a user who complained of "no commitment to the PDP-8 community." A PDP-11 user was even more vocal, saying that "lousy design, poor language (Basic-Plus) and excuses" characterized his software service.

On the other hand, a DP manager for a Colorado company was pleased with the software support DEC offered and praised the vendor's "involvement and interest."

Criticism of IBM

Even IBM with its reputation for user support received some criticism. An IBM 3/10 user noted that he "purchased an industry application program and the local people were not familar with it."

An IBM 3/12 user said "IBM is no longer playing a major role in support," and still another 3/10 user said "the systems people aren't aware of changes."

In general, however, most users called IBM's support excellent.

A user of both Hewlett-Packard and Digital Equipment Corp. equipment noted there was "no local software support" for his systems. A U.S. government user of HP equipment complained that that "vendor's customer engineers are hardware-oriented, not backed by software support personnel."

A user satisfied with HP's software support appreciated the fact that "software updates" were available "at low cost."

A Peoria, Ill. user of HP, DG and Computer Automation, Inc. minis said that both support and maintenance for his systems were excellent. He pointed to "fast response and willingness to work long hours to find problems" as evidence of this and said that vendor's representatives are always available for questions.

A DG user at a junior college called his support good but "technical manuals are terribly written." The people "are pretty sharp," however, this user stated.

Another user of DG Corp. equipment rated software support as lacking. "Problems with RDOS and DG Basic set back our software house severely, resulting in significant delays in delivery. Fifteen months later, DG adopted TAC-Basic," the DP manager noted. Another DG user said that the software support he received from the vendor was good as the result of "a field-proven operating system and languages including Algol, Fortran and Basic."

'Some of the Worst'

A user in an engineering research company said "Interdata has some of the worst software I have every seen" in response to the software support question. Another Interdata user complained that "they have not provided what they promised" in the software area.

A disappointed Datapoint user said the vendor "is unable to fulfill our technical needs without failures," and a Chicago consulting firm said that sometimes "they know less than we do." Other users rated Datapoint's support as good.

NCR's staff is small and "poorly trained," according to one NCR 101 user, while another user of 34 minis from that vendor said the service and support he has received have been excellent. However, NCR 399's "programs are unwieldy and require excessive computer time," a government user stated.

A Burroughs user rated the vendor's hardware maintenance as good, although the "adequate talent sometimes lacks depth and quick response." He said that software support was poor because the vendor was "seldom willing to accept blame" for malfunctioning software.

Because the vendor "supplied canned software free of charge," a Boston Wang Laboretories 2200 C user was very pleased with the software support and a hospital user of the Jacquard J-100 small business system with multiple terminals called the software support he receives from that vendor "excellent."

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System Helping AMC 'Americanize' Engine

DETROIT — The Americanization of a German four-cylinder engine for American Motors Corp. is getting a major assist from a U.S.-built computer.

Recently AMC purchased a complete engine manufacturing plant from VW-Audi, the West German auto producer. However, the facility's machinery and 4,000 drawings for assembly and operation were designed to metric standards and used European electrical systems that operate on different current from those normally used in the U.S.

AMC engineers and DP staff members developed a computer program to speed conversion of the drawings and assembly specifications from the West German standards to those applicable for U.S. operations. Their program runs on a Honeywell large-scale dual Model 66/60 system at the corporate information service center here.

From Richmond, Ind., where the new equipment is being installed, an engineer creates a file on a particular part or circuit using one of 60 electrical symbols stored in the host computer's 512K words of main memory. Another symbol indicates whether the circuit is in series or parallel.

Using a Tektronix CRT, the engineer interfaces on-line with the Honeywell host over a dial-up, 1,200 bit/sec asynchronous line with synchronous modems at both ends. In the data center, a Calcomp 936 printer produces a rewired schematic complete with interconnections and parts cross-references.

"The part and specifications are added to the data base, a tape is produced and the plotter prepares the finished drawing," according to Joseph W. Balnave, AMC director of the corporate information service center.

"It is then available for recall, update or reference whenever needed; meanwhile, the finished drawings are relayed to Richmond in a one-hour turnaround.

"Previous methods took up to six hours to convert a simple diagram to American standards," Balnave said.

Included with the dual Model 66/60 system is a Datanet 6632 front-end network processor that coordinates communications over 20 lines to AMC sites in the Midwest and East, 10 dual-density Honeywell disk units, eight tape units and two 1,200 line/min printers. Nineteen Honeywell 7700 Series VIP terminals are used in AMC engineering and manufacturing centers.

The Honeywell computers were installed in November 1976 to replace a Honeywell Model 635 and will soon assume current loads running on an IBM 370/145.

To manage the engine's conversion program data base, AMC uses Honeywell's Integrated Data Store/II data base manager. The Transaction Processing Executive software package handles terminal-to-host instructions, while the Network Processing Supervisor drives the Datanet 6632.

ACM '77 Set For Seattle Oct. 17-19

SEATTLE — The Association for Computing Machinery will hold its annual conference — ACM '77 — here Oct. 17-19 at the Olympic Hotel.

In-depth sessions will be offered in areas such as data bases and software engineering, computer graphics, computer-aided-instruction and hardware architecture — for minis, micros and mainframes.

Other sessions will explore computer personnel turnover, the Freedom of Information Act, a data base standardization report and long-range computer planning.

Registration forms and further infomation on the conference and its technical program are available from Harvey Z. Kriloff, technical program chairman at (206) 773-0567 — or James S. Ketchel, general chairman, at (206) 623-4987 or (206) 935-6776.

For information on the exhibits contact Michael Rose at (206) 235-3022 or Lawrence Gaylord, special events chairman, at (206) 655-8892.

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Rather Than 'After the Fact'

DP Audit Role Seen Needed Early in Projects

By Frank Vaughan
CW Staff

HOUSTON — DP auditors should become involved with systems while they are under development, rather than "after the fact," especially since most management has stopped looking at the audit function as a review of historical events.

Michael I. Sobol, DP audit supervisor for the Gillette Co. in Boston, made that observation to a recent gathering of the EDP Auditors Association here.

Another reason for auditors' involvement during development is that it is less costly to develop controls up front than to go in after the fact.

In addition, systems development people are less sensitive to audit involvement, and proper "hooks" can be designed and built into the system to reduce audit involvement and time in future system audits. These "hooks" may include special audit reports, special control totals or an integrated testing facility, he explained.

Auditors who are going to be involved with systems under development must have a formal written statement of audit responsibility. A verbal expression of management support is not enough, Sobol said.

Communications is extremely important, he noted. Auditors must be provided with immediate and long-range plans, status reports and other important information. Verbal responses in many areas are insufficient and DP managers should expect requests for formal communications.

It is especially helpful if the auditor is allowed to review the DP department's correspondence file and is placed on the distribution list for project correspondence, he suggested.

Total Involvement

At project initiation, the audit interface is limited. The project initiation report should be reviewed for informational purposes on all high-risk projects and selected medium-risk projects.

When the project reaches the business proposal stage, the problem specification report should be examined for all high-risk and certain medium-risk projects. The audit response at this point should involve limited comments on control features that should be included in the system design report, he said.

The main audit concern during the detailed systems design phase of the project should be with the design of the security and control features. Depending upon the system risk, involvement may vary from total participation on a high-risk project to general controls review for low-risk systems.

During the programming stage of the project, the auditor may be required to spend 25% to 40% of his total time expenditure on the project. Involvement is required in program testing and review, systems testing and review and conversion control.

Parallel Implementation

Following successful system testing, data center implementation and user implementation usually proceed in parallel, Sobol said. The auditor is primarily concerned with the adequacy and completeness of the operational documentation and systems documentation.

He will also want to make certain that user departments receive proper education and training.

The auditor does not usually take part in the final project reviews, but should receive a copy of the final report.

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Data Control Seen as Basic Management Goal

By Molly Upton
CW Staff

TORONTO — Maturity in data processing will be reached when "management is as comfortable with managing data resources as with managing money or material resources," according to a paper prepared by Richard L. Nolan of the Harvard Business School.

First, however, management must focus on managing data rather than concentrating solely on the CPU and related hardware, Nolan said in his paper, presented at the International Federation for Information Processing (Ifip) Congress 77 here recently.

The paper presented a starting point for a panel discussion on ways to implement the concept of data resource management. Some of these ways include a charge-back system based on a value-added concept, implementation of data base technology, implementation of data administration functions and the dispersal of functional analysts and programmers into user departments, according to Nolan's paper.

Nolan expanded from four to six the various stages of DP management, from the inception of DP to maturity, to reflect the assimulation of data base technology. The first four stages involve building applications, the DP organization, DP management planning and control and developing user awareness.

With data bases facilitating the separation of data from individual programs, the DP department can manage the data resources of the firm and the user/managers can manage the functions, such as processing and payroll, the paper indicated.

Prediction for 1980

Nolan predicted that by 1980 three types of computers will comprise the typical DP installation: a data machine, a processing machine and a control machine.

The data machine will handle management of the organization's data and will be linked with the data bases. The processing unit will perform value-added functions of "combining, mutating and distributing data to produce information," the paper said.

The control machine will provide accounting, scheduling and monitoring as well as billing.

To accompany the changing technology, the organization structure will include a senior executive, probably a vice-president, with two line functions of data administration and data processing. The latter will be similar to current sophisticated operations activities, but functional systems analysts and programmers will work with the user departments to develop programs that reflect the user's needs, the paper said.

In a brief explanation of the chargeback scheme, Nolan's paper indicated users would be charged for the cost of the data plus the value-added services of processing it.

Walter Carlson, corporate marketing consultant for IBM, expressed skepticism that the DP installation would be as Nolan described it by 1980; he said, perhaps it will be within 10 years.

He agreed the real question is how long it will take people to realize DP revolves around data rather than the CPU.

Through a statistical analysis of customer records, IBM has deduced that a small sample is arriving at Nolan's fifth and sixth stages, and an even smaller fraction is going toward greater end-user involvement in the shape of distributed processing.

Carlson asked how Nolan is going to explain that phenomenon.

Although he agreed with the concept of charge-back for data on a value-added basis, he warned this should not be left to accountants. Such an intangible subject as data, which can be possessed simultaneously by more than one entity, will "drive accountants up the wall," he said.

Perhaps some dramatic proposal — such as the DP department paying a price for the data it uses and charging customers for the data it delivers — should be suggested in order to start the use of this scheme. Possibly one could estimate the latter charge by calculating the expense that would be incurred by the using department if the DP department didn't exist and dividing that sum by some number, he suggested.

Carlson would place the DP resources controller outside of the DP department and under the corporate controller or in each of the firm's profit centers.

The proposal for a DP resources controller is "the key to making the DP department an efficient and respected partner in corporate goals," he said, urging experimentation with the concept.

Irwin Sitkin, vice-president of corporate DP at Aetna Life and Casualty, commented there will be more stages of growth. Perhaps there are four rather than six, with the four being repeated. "It's not important how many stages there are, but you do need a feeling for where you are," he said.

Aetna has been shifting emphasis from managing hardware to managing data, he said.

Samuel Kahn, manager of the information system department at E.I. DuPont, said he felt corporate management had been allowed to abdicate the responsibility of managing DP. "We have failed to convey the idea that DP is a technology that can be managed like any other technology," he said.

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Pinpoints Partner Attitudes

Word-Analysis System Examines Marital Flaws

By Jeffry Beeler
CW Staff

DES MOINES, Iowa — If your marriage is on the rocks or just heading that way, perhaps you can get the expert counseling you and your spouse need from a series of computerized word analysis programs.

Dubbed the Marital Climate Inventory (MCI), the three programs help marriage counselors and professionals in related fields pinpoint the source of problems in husband-wife relationships, according to Dr. Charles Cleveland, president of Grey Matter here, which developed the programs. Grey Matter also uses the programs to counsel engaged couples, Cleveland added.

The programs analyze troubled marriages by asking husbands and wives to answer 58 open-ended questions dealing with nine topics — love, sex, money, relatives, communication, religion, selfishness, children and freedom. A Control Data Corp. 415 keypunch unit is used to convert the results usually totaling about 1,000 words) into machine-readable text, which a 49K-byte CDC 6400 scans and compares against a computer-stored lexicon of 15,000 frequently used English words.

Interpreting each word in the responses, a Grey Matter program identifies the main attitudes characterizing the couples' relationships and reports its finding on 10-page printouts.

With their knowledge of how certain attitudes correspond to various degrees of marital harmony, Cleveland and his colleagues can then assess the emotional health of their clients' relationships and spot major flaws.

Field Tests

In field tests at the University of Iowa, Grey Matter's computerized diagnoses agreeed 91% of the time with the independent findings of three practicing marriage counselors, Cleveland claimed.

Besides marriage counselors, typical customers of Grey Matter's word-analysis programs include clinicians, physicians, lawyers and the clergy.

The programs particularly benefit clinicians, Cleveland says, by allowing them to diagnose marital ills after only one or two meetings with their clients. This is important because couples seeking marriage advice frequently become discontent and discontinue their counseling if clinicians do not quickly identify the cause of their domestic woes, he explained.

In addition to the other hardware modules, Grey Matter's configuration incorporates a Cyber 74 mainframe, a CDC 844 disk drive, a CDC 501 printer and a CDC 604 tape drive.

ICCP Extends CCP Deadline

CHICAGO — The deadline for registering for the Certificate in Computer Programming (CCP) examination has been extended from Aug. 31 to Sept. 15.

The examination, which is being offered by the Institute for Certification of Computer Professionals (ICCP), is being given on Oct. 22 in over 100 colleges, universities and test centers around the world.

Study guides for the examination may be obtained from ICCP's New York Office at 304 E. 45th St., New York, N.Y. 10017.

Register Now For CDP Exam

CHICAGO — The Institute for Certification of Computer Professionals (ICCP) has begun accepting registrations for the Certificate in Data Processing exam, slated to be administered on Feb. 18:

Applicants will automatically receive a study guide containing a new outline for the test. Applications and fees must be submitted to the ICCP by Dec. 15.

Send requests for applications to 304 E. 45th St., New York, N.Y. 10017.

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Editorials

First Things First

The governmental stamp of authenticity has descended on the information industry with a dull thud.

Confirming what members of the DP community have known for a long time, a Department of Commerce report claimed that the total "information sector" accounted for 46% of the U.S. Gross National Product [CW, Aug. 22].

What makes the percentage more impressive is the fact that it was based on 1967 statistics. Without doubt, this figure has grown in the last 10 years.

Recognizing that the U.S. is moving from an industrial society to an information society, the Office of Telecommunications report calls on the executive branch to formulate a national information policy. Part of this policy would be to "adopt a prospective look at future applications of information technology," the report said.

The implications of a national information policy include the use of information (and the the ability to convey that information) as an instrument, perhaps, in international diplomacy. A rudimentary beginning to this type of information use may lie in the standards struggles now associated with the interconnection of national public data networks on an international scale.

The unfortunate part of such forward thinking is that the global issues are surfacing before the primary issues have been addressed. A society that has not yet decided how it can guarantee individual privacy against the onslaught of ever-enlarging data bases is now called upon to formulate information policy.

There is no doubt that the ability to gather and process data will become increasingly important in the years to come. It is probably inevitable that nations which become sophisticated in manipulating and moving this information will have a significant power.

But a national policy for dealing with information will be successful only after the rights of the individual have been ensured against unwarranted intrusions into personal data.

A society dedicated to the use of information for the common good should not hesitate to limit the uses of data gathered from the private sector.

No Easy Answers

The computerization of a job may have a dehumanizing influence on the worker. This was one of the findings presented at a session on job satisfaction and computers at the recent Ifip Congress.

It is not surprising that workers feel loss in control when their jobs become automated. But this means there is more to achieving worker efficiency than simply installing a computer.

One of the panelists at the session told of bank tellers who no longer considered themselves "bankers" after they began to work with an automated system.

There are no easy answers to these types of peripheral problems. It is hard to argue that computers should be used sparingly and only when they do not dehumanize the workers involved.

Some type of management assurance might have to be given that the machine will never replace the reasoning power of the worker.

In some cases, problems have been avoided by involving the workers who will be using the system in helping to design it.

There has been much discussion in the past of whether computers actually replace people. Perhaps the real issue all along has been whether the computer leads the worker to assume the role of a disinterested onlooker.

Data Past

Five Years Ago
Aug. 30, 1972

BETHESDA, Md. — A government advisory committee was told here that it might be too late to stop the trend toward the use of the Social Security number (SSN) as a universal identifier.

While no conclusions were reached, witnesses before the committee, formed by Secretary Elliott Richardson of the Department of Health, Education and Welfare, described planned or already-implemented computer files with the SSN as chief file access.

— — —

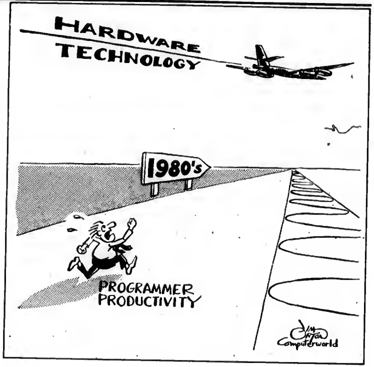
SAN FRANCISCO — Itel announced a 7305-2 fixed-head file that was plug-to-plug compatible with the IBM 2305-2; a 7305-3 file that offered slightly lower performance; and a 7835 control unit, compatible with the IBM 2835.

Eight Years Ago
Sept. 3, 1969

WHITE PLAINS, N.Y. — IBM introduced the 54-nsec system 360/195. The company described it as big, very fast and priced to offer users more for their money than large-scale systems made by other companies. Delivery was scheduled for 1971.

— — —

LOS ANGELES — Computer Sciences Corp. announced it would offer a broad range of facilities management services, including equipment installation, checkout/testing and maintenance. The services were being offered to users as an alternative to hiring IBM's field and systems engineers.



'Hey, Wait for Me!'

Letters to the Editor

Credit Should Go to RCA

How quickly we forget! The Aug. 8 editorial, "New Heyday Coming?", stated that Amdahl is "generally credited" with the "concept of the alternative system."

My associates and I vividly recall that RCA was the first to offer (and sell) CPUs that would run IBM operating systems. That was back in 1970, before many folks knew how to spell Amdahl.

Jerry B. Nesmith
Atlanta, Ga.

Unfair to Withington

The headline on page 3 of the Aug. 8 issue as well as the first paragraph are unfair to Frederick Withington. To suggest that his reluctance to testify against IBM stems from his contractual relations with that company is laughable to anyone who knows the gentlemen, but unfortunately may affect his reputation to those who don't.

The issue in the case was whether the govenment, in it efforts to show IBM monopolized the industry, had the right to force an expert to disclose in court the knowledge he gained from his employment without agreeing at the same time to pay an expert's fee.

The Court of Appeals in New York noted that Withington had agreed to testify but later declined at the direction of his employer, Arthur D. Little. The court also noted that questions of conflict of interests were considered before ADL appealed.

The issue, said the Court, was well stated by Withington when he said "the government is seeking the very core of my expertise which I do not wish to provide and which I consider to be a proprietary asset available solely to my employer or to those for whom I wish to work."

For CW now to imply that Withington's real reason for protesting the government action was that he owned IBM stock and had received payments from IBM as advances for a book to be published through Addison-Wesley, his long-time publisher, does dishonor to an honorable man.

Robert Bigelow
Boston, Mass.

Satisfied Micro User

As a dedicated computer hobbyist and professional programmer, I read with dismay E. Dijkstra's statement that micros produce unreliable output ["Micro Programmers Seen Facing Old Problems," CW, Aug. 15]. I speak from personal experience when I say that the output from micro-based systems is at least as reliable as that from a large system.

My own micro, built from a kit, has enjoyed a perfect record of performance in the eight months it has been operating.

I think the reliability problems we hear so much about are mainly caused by unfamiliarity with kit building or using the cheapest available parts instead of the best.

I. Barron's statement, quoted in the same article, that "What is really needed is a 4- or 5-bit word length" appears to be the result of rather fuzzy thinking. The 4-bit word is available in the 4004 processor from Intel, but I don't see very many people using it in computers.

If we went to 4-bit words, what would happen to the magnificent APL character set? Efforts in computer graphics and artificial intelligence would be crippled by Barron's suggestion.

William L. Colsher
Hoffman Estates, Ill.

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Automated Physician Seen Design Fantasy

By Jack Stone
Special to CW

Surely all of us will speculate on the real utility of computing systems in medical practice if we have to enter a hospital for diagnostic or therapeutic procedures. One conventional style for reporting on the effectiveness of the technology in this area is to interview a well-known physician who has had great success in using it.

But circumstance provided me with an alternative — extended informal discussions with articulate members of the new generation of medical practitioners.

A few weeks ago, I traveled to the Rangeley Lake region of northwest Meine; I had been invited there to catch up on some writing commitments and enjoy the beauty and serenity of the area. It was a serendipitous event when I met two of the other houseguests.

One was Keren Hendrickson, a 24-year-old registered nurse from Washington, D.C.'s George Weshington University Hospital, a facility associated with the George Washington Medical School. The second was her escort, Gordon Anderson, 28, a third-year medical student at George Washington.

We talked about many aspects of their careers, including subjects of professionalism, humanism and ethics in the practice of medicine. Karen and Gordon easily related to my questioning regarding the role and potential impact of computers in medicine. Here is a relevant distillate of our converstions:

Question: Where do you feel that computer technology has been particularly helpful to the medical profession?

Karen: Computer-based instrumentation in emergency situations has been of inestimable value. It has assisted physicians in saving many lives because it provides physiological information very quickly.

Question: Do questions of instrumentation accuracy or reliability give you cause for concern?

Gordon: Not really. We all recognize we're dealing with machines which, although they are expertly engineered, will break down from time to time. The equipment is always under the watchful eye of a trained person who has the experience to react to a machine malfunction.

Oh, I'm sure that human and machine errors have been made, but the net of it is that many, many more lives have been saved with the equipment than have been lost.

Question: How about outside of emergency situations?

Gordon: New computer-based systems are regularly arriving in hospitals today because of the falling costs of hardware. For example, computer-controlled X-ray scanning instruments are providing answers to medical questions which previously were available only from exploratory surgical procedures.

As another example, hospitals use computer-based patient monitoring equipment in the intensive care units. This gear allows continuous monitoring of a group of these patients by a relatively small number of medical personnel, thus releasing highly skilled people for other crucial assignments, a goal of great concern to most hospitals because of shortages of personnel in this category.

The Human Connection

Question: How about the uses of computers in the educational process?

Gordon: We have remote access to a comprehensive computer-assisted instruction [CAI] system from a terminal in our library. Our CAI provides literally hundreds of hours of tutorial drills in such subjects as anatomy, physiology and biochemistry. I only wish I had more time to spend at the terminal.

Question: What do you think is the area of greatest need for computer support?

Karen: That's easy — automatic storage and retrieval of patient medical records. These records are typically unsorted pieces of many different forms, haphazardly filed.

Frankly, the records are in such a mess that, in the interests of saving time, doctors and nurses are often forced to repeat medical history interviews and lab tests, which naturally result in more trauma for the patients and more cost to the hospital.

Question: There is speculation about the completely automated doctor — over a machine which interfaces directly with the patient, conducts the history interview, makes the diagnosis and dispenses the medicine. What are your comments on this possibility?

Gordon: If such a machine were built, I guess I would keep an open mind before I accepted it or rejected it for my practice. But I would surely want to carefully study the results from tests by research and clinical physicians, as well as patients' comments, before I ever used it with my patients.

You see, I believe in the treatment of the whole person, trying to understand and respond to not just the physical ailments, but to the patient's emotional and social problems. This philosophy is of growing importance today, since perhaps 70% of the people visiting the doctor's office have symptoms derived from other than purely physiological causes.

A successful treatment program of this kind is strongly dependent upon proper diagnosis, which in turn is dependent upon the willingness of the patient to communicate symptoms accurately.

Based on what I know now, I feel that it will be a long, long time before human affections are machine-programmable.

Kahn's Ideas Reduce Overbooking's Damage

The Taylor Report
By Alan Taylor CDP

Overbooking by the airlines is a computer optimization problem that is continuing to plague the public. Alfred Kehn, the new chairman of the Civil Aeronautics Board, understands the concepts of optimization as well as any DPer.

However, in his personal set of equations for the optimization function, Kahn includes certain variables not often included by systems designers.

He includes, most importantly, factors that measure the amount of damage to society — and then seeks to minimize that damage. This factor may well be the most important missing variable in innumerable computer applications.

It is therefore not surprising that the answers Kahn comes up with differ from the ones that others develop. A measure of this difference was evident in one of Kehn's first press conferences.

At that conference, he suggested a different approach to solving the overbooking problem, an approach that minimizes the damages while retaining the advantages of overbooking.

Kahn brings the passengers into the equations by suggesting they have a say in the matter. In his off-the-cuff comments, he suggested offering $100 to any passenger who volunteered to be bumped from a flight.

Dutch Auction

Another idea — that the pilot conduct a type of Dutch auction before take off to get enough passengers to deplane — is interesting enough to follow through beyond the simple monetary amount Kahn suggested. Many passengers are not going to stop flying at the end of one leg of their journeys, so they could be offered alternative routings to their final destination, as well as the compensatory cash.

Other passengers flying on some of those odd connections — the ones that can keep you in the air for eight hours at a stretch without more than repeated peanut snacks — might well fall for a deluxe dinner.

The number of positive inducements that can be offered to encourage deplaning would be limited only by the imagination of the auctioneers.

Negative inducements — items which would make deplaning very unwelcome — could also be figured into the equations. For instance, a passenger's worry about the people who will be waiting at the airport to meet him is a most powerful deterrent to deplaning. An airline that used its own resources to track down and inform those people would be way ahead — particularly if there was some form of hospitality offered to those meeting bumped passengers.

Yet another way to reduce the social damage from overbooking might be to exclude certain passengers even from being asked to volunteer to deplane or from having to take part in a lottery. Grandmothers traveling to grandchildren's weddings, anyone going to a funeral, children flying to their parents, for instance, could reasonably be given preference on a flight.

All of these methods — positive inducements, negative inducements and priority rankings — can by their mere exercise reduce the social damage of overbooking. Even if a person is bumped from a flight, the damage is reduced because he knows that he and the other passengers have made the decision jointly with the airline, rather than having been the subject of an arbitrary act by itself.

The Ultimate Situation

One of the problems with the Kahn technique would be in identifying the ultimate problem size. Currently the figures show thousands who are unable to reach their destinations within four hours — but the figures are silent regarding the number who are drastically disturbed by late arrival, be it two hours or 12.

Yet it is in the number of really serious events (such as the Ralph Nader bumping) that the problem really exists. If there is a serious situation, such as the last flight out on Christmas Eve where no one wants to be bumped, even for $200, then some decision has to be reached. Presumably a lottery would choose the unlucky one — but the need to hold such a lottery would, of course, be a reportable event.

Naturally, the question of whether overbooking of that specific flight (as opposed to other flights) was proper could be looked at, and hopefully if the same situation recurred the algorithms would take the cause into account. In fact, the very existence of "ultimate situation" reports would indicate a variable missing from or miscalculated in the current algorithms. And finding missing and incorrect variables is exactly what any proper optimization technique should do.

The Kahn approach, therefore, could operate to optimize situations in a way we currently do not. As well as looking at the social dangers, it also improves the technical situation. And that's an excellent result.

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'I'd Flunk CDP Miserably'

Letter to Lord From Rigo: 'Sorry, No Deal'

By Joe Rigo
Special to CW

Dear Ken Lord,

Thanks for the offer, but it's no deal.

I read your challenge to me in the July 25 issue of this paper to take and pass the exam for the Certificate in Data Processing (CDP). Now, the exam may or may not be any good, but on one point you are absolutely right: i would flunk it miserably.

I can say this with some authority. I've been flunking tests like this for years.

This is one reason why I am so opposed to the CDP and to its illegitimate stepchild, the Certificate in Computer Programming (CCP). If I ever have to pass one of these things to keep my job, It will be the end of a beautiful career.

My problem, alas. is that I have become an old man. It is not that I turned 44 a couple of months ago. The important figure is that I have been in data processing for 13 years now.

Tests like this are for kids just out of school. Kids are equally ignorant in all areas. Their heads are filled with useless facts. They can remember the difference between AND and OR without looking it up.

Reader Commentary

My brain is pockmarked with hills and valleys. Things like AND and OR are hidden away with my sixth grade lists of the major exports of South American countries.

A lot of us old people are like that. We remember what we need for today's job, and we learn what we will have to know for tomorow's. The rest gets rusty.

Then there is the question of motivation.

Admittedly, I could improve my chances for the exam by hitting the books. But what's the point?

I have been around for a while. I have a track record. Good or bad, the products of my work are available for inspection. Even worse, there are living witnesses who will blab the truth to anyone who asks.

Acquiring a CDP would do nothing to improve my failures or reduce my successes. It certainly would not inspire any of the witnesses to change their minds.

Finally, let us consider whose leadership I would be following.

There can be no question that some very good people have acquired a CDP. I have purchased the Brooklyn Bridge myself a couple of times over the years. But let's not confuse the buyers with the sellers.

Consider for a moment the words of the Chief Professional Prof. G. Gary Casper, CDP.

Casper is one of your people, Ken. He is this year's president of the Institute for the Certification of Computer Professionals (ICCP). He is in charge of peddling certificates to an industry that seems to get along very well without them.

I quote from his article in the July issue of *Infosystems*:

"The trade and technical press, convention speeches and publications of the professional societies are full of examples of massive and pervasive incompetence on the part of computer practitioners . . .

"An even more appalling situation is that our computer systems are designed, implemented, operated and controlled by people who virtually lack any commitment, social responsibility or ethical control. The only responsibility many of these people accept is the periodic gathering of a paycheck."

Now be honest, Ken. Do you really expect me to do business with a guy who goes around saying that my friends and I are nothing but a sleazy bunch of bums?

As an alternative source of leadership, let me throw out the name of Carmine Vona.

I worked with Carmine a few years ago at one of the large banks in New York. I like to think of him as a chief programmer in the best sense of the term. He prefers to be classified as a systems analyst, but that topic is for another article.

Carmine was a professor of nuclear physics in Italy. He worked there for IBM for a while, spent a year teaching school in northern Brazil and eventually made it to the U.S.

When I knew him, he was dragging the bank, kicking and screaming, into modern systems design. He investigated the application, designed the system and supervised the analysts and programmers who implemented it.

When he says the next project phase will take X weeks and cost Y dollars, you can set your watch by it.

Carmine drives his people mercilessly, but everyone wants to work for him. Somehow he always finds time to drill some of the fine points of system design into the head of a young programmer.

I have never heard Carmine say a bad word about anyone. He makes everyone around him look good. His managers are constantly getting promoted. His systems work, and his users love him.

Carmine does not have a CDP. He is not active in any of the professional societies. He does not attend industry conventions or user group meetings. He works like a demon all day on the job, and he goes home to his family in Brooklyn at night.

Alas, I am no Carmine Vona. I am up to my eyeballs in professional associations. I look forward to meeting old friends at the conventions. And I am hopelessly addicted to writing these occasional articles for CW.

But I still have a few years to go.

Chief Professional Casper and his ilk can go on ranting about how rotten we all are. You can have him, Ken. You can also have the CDP, the CCP, the code of ethics and Professionalism.

I just want to be like Carmine Vona when I grow up.

Letter to the Editor

Chess Schedules at Ifip

I must correct an implication of the caption to the Aug. 15th front-page photos of the chess tournament at Ifip Congress 77.

The caption reads "Some played games as others crowded into technical sessions." In fact, the chess tournament was held entirely during hours when no technical sessions were being held. One could watch all the chess games and still attend a full schedule of technical sessions.

Daniel Glazer
Washington, D.C.

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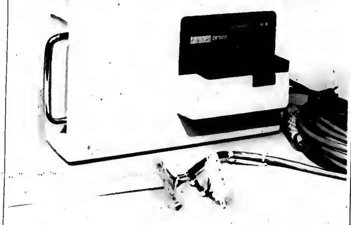

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Help Wanted

A special report on Data Base Management Systems (DBMS) will be part of the Oct. 31 issue. We welcome suggestions on topics to be covered and user-written articles describing experiences with the systems.

Write-ups should focus on problems and solutions affecting any part of the user's expectations, selection, implementation or use of the DBMS — or, if appropriate, why the project failed.

Contributions should not exceed 1,200 words (four or five double-spaced pages) and should reach Don Leavitt, Computerworld, 797 Washington St., Newton, Mass. 02160, by Sept. 24.

Names Asked For CPE Prize

WASHINGTON, D.C. — The annual A.A. Michelson award recognizes a significant contribution in the realm of computer performance evaluation (CPE). Nominations for this year's award are now open and suggestions from anyone "would be most welcome," according to selection committee chairman Phil Kiviat.

Presented by the Computer Measurement Group (CMG), the 1977 award will be made in late November when CMG holds its annual meeting. This year the meeting will be held jointly with the Association for Computing Machinery Special Interest Group on Measurement and Evaluation (Sigmetrics).

Started just three years ago, Michelson awards have gone to Kenneth Kolence, Thomas Bell and, in 1976, to Kiviat.

The names of award candidates and summaries of their accomplishments should be submitted by Sept. 15 to Phil Kiviat, Technical Director, Fedsim, Washington, D.C. 20330.

Annual Survey Finds

'Average' DOS Site Has 135

By Don Leavitt
CW Staff

MINNEAPOLIS — The "average" IBM DOS installation has a purchased 370/135 with 3340 disk drives. The most popular software products are Cobol, Power, CICS and Dbomp — all from IBM — and Panvalet from Pansophic Systems, Inc. These are among the conclusions of the latest annual survey of the Minnesota DOS Users Group, according to Tom Teresi, president of Advance Computer Systems Co. and former president of the group.

Adamantly independent of IBM, this group is one of the largest and most active organizations of its kind in the country. It has over 300 members, many of whom are from the upper Midwest. In addition to conducting the annual survey, the group holds monthly meetings to discuss common problems and, hopefully, solutions:

"This year's survey was our largest ever. We had 160 installations representing 175 IBM 360/370 CPUs," Teresi said. "All machines supporting DOS or DOS/VS were represented. They ranged from a 360/22 with 32K to a 370/158 with 3M bytes (real). We even had a response from a [Control Data Corp.] CDC 480 site.".

Detailed survey results were provided free to members of the group who completed a questionnaire on their installation.

Some Surprises

The results contained a number of surprises. Most notable, as far as Teresi was concerned, was the finding that only 67% of the installations have 370s installed; one-third still had only 360s.

Equally distressing to IBM must be the fact that only 21% of the on-order 370 CPUs are replacing installed 360s. "There is no joy in Armonk over these conclusions," Teresi mused.

"Evidently the 360 series continues to offer a good bang for the buck. The 360 users' resistance to upgrade has forced IBM to make improvements to the 370 line (e.g., VS, 138, 148). Similarly, improvements in the 370 line have brought about significant price reductions in the 360 series.

In the software category, only one product was able to command a larger following than the IBM alternative. Panvalet was the most popular source library system, even surpassing the free source statement library facility of DOS.

However, IBM's hardware and software products were the most popular in all other categories. Of the 87% who spooled, nearly three-fourths used IBM's Power. Fully 50% of the teleprocessing uses chose CICS. Surprisingly to Teresi, only 60% of the users reported having an on-line system.

A data base system was used by 43% of the users. In what turned out to be a close "race," IBM's DL/1 with 15 installations edged out Total from Cincom Systems with 12 users. However, neither package could match Dbomp with 29 installations.

As expected, Cobol is used as a primary language at 65% of the installations.

Further information about the group's meetings or the survey is available from Teresi at Advance Computer Systems Co., 3333 Regent Ave. N., Minneapolis, Minn. 55422.

APL-Based 'Quickplan' Helps Financial User

BETHESDA, Md. — The APL*Plus Quick Planning (Quickplan) system, now on the Scientific Time Sharing Corp. remote-computing network, is designed to help in corporate planning and reporting, according to a network spokesman.

The vendor sees Quickplan as particularly useful in generating a variety of financial reports including balance sheets, income statements, budgets, spread sheet analysis; forecasting, sales projections and lease/buy analyses.

Although the system is based on APL, little or no knowledge of that language is required to use Quickplan. Most of the user's responsibility lies in responding in English to the system's requests about what data is wanted and where it should be placed.

The system supports the naming and positioning of page headings and column titles in that way as well as the assembly of data from existing files. Simple mnemonic operators give the user basic tools to define what fields or lines are to be accumulated for subtotals and totals.

In some cases, the system calls on the user to indicate which of several possible choices he wants Quickplan to follow by keying in one of APL's special symbols, but its use in such a situation is unrelated to the symbol's conventional use within APL.

Practically the only time the user needs to be aware of how APL works is when the report program and, if desired, a calculation program to determine new values from givens, have to be brought into "workspaces," a concept unique to APL, before they can be used.

Scientific Time Sharing Corp. is headquartered at 7316 Wisconsin Ave., Bethesda, Md. 20014.

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Computer Science Group Seeks Curriculum Reaction

J. Daniel Couger On Education

The working report on curriculum for an undergraduate program in computer science has been released for comment by the Association for Computing Machinery (ACM) Curriculum Committee on Computer Science (C^{3}S).

Revision of "Curriculum '68," the widely accepted model for degree programs, has been a long time in the making. The revision cycle began in July 1974. More than 50 persons provided direct input to the basic C^{3}S committee composed of: Richard H. Austing (University of Maryland), Bruce H. Barnes (National Science Foundation), Della T. Bonnette (University of Southwestern Louisiana), Gerald L. Engel (Virginia Institute of Marine Science) and Gordon Stokes (Brigham Young University).

This column will discuss the curriculum model. The next one will review the committee's recommendations related to staff and facilities.

The computer science curricula fans out from Computer Programming I and II to Assembly Language Programming, Introduction to Computer Organization, Introduction to File Processing or Organization of Programming Languages. The Assembly Language and Computer Organization courses each lead to Operating Systems and Computer Architecture I, while the File Processing course leads to one on Data Structure and Algorithm Analysis.

The computer science major consists of these eight courses plus four others, selected from a range of elective advanced courses. The committee purposely omitted a course in "Computers and Society." The reason will be explained below.

These 12 courses represent 36 of the 48 semester hour minimum requirement for the computer science major. The remaining 12 hours would be taken in mathematics.

The student begins at a very practical level and progresses to more conceptual and theoretical material. At the junior level the student program is strongly conceptual, while the senior year the program may be fully theoretical or involve a significant amount of theory supplemented with laboratory activities.

Ambiguous Math Requirements

The report appears somewhat inconsistent in its math recommendations. Page 3 states, "It was recognized in the process of specifying this core material that no mathematical background beyond the ability to perform simple algebraic manipulation is specifically required as a prerequisite to an understanding of the topics."

Page 12 says, "The interaction of mathematics with the computer science curriculum is clearly indicated by the prerequisite chart given. It is specifically recommended that all computer science students take Introductory Calculus, Mathematical Analysis I, Linear Algebra and Discrete Structures. Depending on computer science electives chosen, Mathematical Analysis II and Probability and Statistics may be required."

Engel clarified this problem: "The eight core courses could be taken as a minor in another field, independent of the math courses. Students majoring in computer science are expected to take the math courses."

Only two courses were added to the curriculum model published in 1968, according to Engel: the file processing course and the computers and society course. Contents were updated for the remaining courses.

Societal Issues Left Out

The course on computers and society was omitted from the program so that prerequisites could be simplified to admit non-computer science majors. The report states that "a mixture of majors . . . would provide broadening interchange and would benefit both computer science students and the other majors."

When asked to indicate other major changes, Engel said "the integrated approach for teaching operating systems and computer architecture is new. Also, a new way of thinking is required to combine algorithms and data structures into one course."

Special Topics Courses

The report recommends that special topics courses be offered in addition to the 25 courses identified in the program, because "the available matrial is changing rapidly." Examples of the special topics recommended for consideration in such a course are: Microprocessor Laboratory, Performance Evaluation, Telecommunications/Network/Distributed Systems, Systems Simulation, Graphics, Artificial Intelligence, Structured Programming, Software Engineering — Large Systems Design, Topics in Automata Theory, Topics in Computability, Topics in Formal Language Theory and Simulation and Modeling.

Copies Available

The 16-page working report was published in the June 1977 issue of *SIGCSE Bulletin*. Copies may be obtained for $2 each from ACM, 1133 Avenue of the Americas, New York, N.Y. 10036.

C^{3}S is soliciting comments on the proposed curriculum. They must be submitted by Dec. 1 to Gerald Engel, Department of Computing and Statistics, Virginia Institute of Marine Science, Gloucester Point, Va. 23062.

Couger is professor of computer and management science at the University of Colorado.

T/S Net Adds Foreign Data

WALTHAM, Mass. — A financial data base covering balance sheet and profit-and-loss account items for each of 2,000 foreign companies, Exstat was developed in England and is now available through the international time-sharing network of Interactive Data Corp., a spokesman said from 486 Totten Pond Road, Waltham, Mass. 02154.

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Notes and observations from IBM
that may prove of interest to
data processing professionals.

Litton's 'Blue-Collar' Job for Finance System

At a Litton plant in Van Nuys, California, Liliane Perini enters production data, encoded on a magnetic stripe, into a terminal of the IBM 3600 Finance Communication System.

Designed to meet the diverse needs of today's financial institutions, the IBM 3600 Finance Communication System is also proving highly useful in the manufacturing environment.

At the Data Systems Division of Litton Industries in Van Nuys, California, and Lubbock, Texas, a 3600 controls the flow of materials through plants that produce command and control systems for the United States Government. The key component is the 3604 Keyboard Display. Used as a teller terminal in many banks, it serves as a data entry and display terminal at Litton.

Whenever a shop order is created, the 3604 encodes product information on the magnetic stripe of a "traveler card"—much like a personalized bank card—which accompanies the material being processed as it passes through a series of work stations. After work is completed at each station, the worker inserts the card in a 3604 Keyboard Display, which reads the encoded data, times it and enters it into Litton's IBM System/370 Model 158.

Production workers enter information at the 3604 through easy-to-use function keys, with step-by-step guidance provided by the system. Data captured at the 21 shop-floor terminals updates master files of open orders stored in IBM 3601 controllers, which act as local processors.

"The exact status of any order is available to production supervisors at any time through the terminals," says Bertram Voddon, vice president of operations. "Each night, accumulated data is forwarded to the computer in Van Nuys, where it is processed and made available the next morning in the form of production reports and analyses."

As John Lawrence, vice president of finance for the division, points out, the online 3600 system does for shop orders at Litton what it does for bank accounts at financial institutions—it makes full, up-to-date information available to authorized personnel.

"And with 9,000 shop orders active here at any one time, that's no small accomplishment," he adds. "The 3600 is keeping us on top of operations in a way that was never possible before."

J. I. Case: Super Service on Spare Parts

"We've been able to cut inventory by more than 12 percent," says Jack A. Chobanian, director of service parts supply systems at J. I. Case, one of the largest and oldest manufacturers of farm tractors and construction vehicles in the United States.

Four years ago, Case converted the management of its service parts inventory to an online computer system which it calls AIDS (Automated Inventory Distribution System).

"Even while reducing inventory, we eliminated 75% of our backorder count. Conversely, our 'fill rate'—the proportion of items delivered without backorder—improved by 8% in the same period."

Case, a Tenneco company, fills 2,000 orders a day, shipping a total of 20,000 line items from its main warehouse in Racine, Wisconsin, to ten regional warehouses and a network of distributors and dealers.

To support its broad line of current equipment models, in addition to earlier models spanning the past 35 years, the Case Service Parts Division maintains an inventory of 155,000 separate part numbers.

"We were able to cut $8 million out of inventory while increasing the fill rate because the online system gave us much better forecasting data," Chobanian notes.

"Previously," he continues, "we based our inventory projections on replenishment orders from the warehouse. Now, with order entry as an online system, we can look at accurate figures for real dealer demand."

AIDS runs on a System/370 Model 168 in Case's corporate computer center in Racine, under Multiple Virtual Storage (MVS) and Information Management System/Virtual Storage (IMS/VS). The system is accessed through 85 IBM 3277 Display Stations in warehouse and office locations.

Major online subsystems include order entry, depot replenishment, order inquiry, purchasing, receiving, forecasting and warehouse control. Under AIDS, orders received before 1:00 PM are shipped on the same day; those received later go out the next day.

"Before we installed AIDS, the division's warehouses were full to capacity just with agricultural parts," Chobanian notes. "When spares for the construction equipment line were added to its responsibilities, the division wanted to add new warehouse space. Now, with AIDS, we are handling both product lines from the same space.

"At least as important as the purely financial gains from slimmer inventories and fewer backorders," Chobanian asserts, "is the way AIDS has improved customer service. The lack of a small part, worth a few cents, for a work vehicle can stall an entire construction project at a cost of thousands of dollars a day. Similarly, a farmer's losses can be devastating if a tractor goes out of service during a harvest.

"With the online AIDS system, we're getting repair parts out where they're needed, faster than ever before. And our customers really appreciate it. We can't measure the business gain directly, but we know it's important."

J. I. Case uses an online IBM computer to help insure that service parts are always available for farm tractors (above) and construction equipment.

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

IBM
DATA PROCESSING DIVISION

Project Control Still Seen as Vital Application

• Net Adds 'Prosys/80'

WOODBURY, N.Y. — The Prosys/80 service is a project control system that integrates project scheduling, cost control, accounting, resource leveling, forecasting, performance measurement and data base management, according to a spokesman for Calldata Systems, Inc., which offers the service.

Among the graphic and tabular outputs of the service are schedules, comparison schedules, network logic diagrams, cash-flow reports and manpower leveling charts.

Users may specify their unique input, output and computational requirements while still using the system's standard algorithms, the spokesman claimed. Major items that Prosys/80 will control include time, manpower, costs, quantities and equipment needed for a project.

The system should be especially useful for projects in construction, engineering, plant maintenance and shutdown, education and manufacturing, as well as research and development and government programs, the spokesman suggested.

The facilities of Prosys/80 are available on the Calldata remote-computing network or in a software package that can be installed on an IBM 370 or many other CPUs that support standard Fortran.

On the network, the user is charged for time and resources used. The packaged version of Prosys/80 requires some 300K of main memory and a mass storage system and costs approximately $50,000 depending on modules selected, Calldata said from 20 Crossways Park N., Woodbury, N.Y. 11797.

Motorola 6800s Get FP Support

DENVER — A floating-point (FP) package and a cross-assembler with FP pseudo-operations are available from Scipro, Inc. for use with Motorola 6800 microprocessors. The basic floating-point package, FPP/6800, performs the arithmetic operations and Ascii I/O conversions, Scipro said.

An extended package also performs square root, exponential, logarithm, arctangent and trigonometric functions as well as floating-point comparisons. Three versions with 4.5, 7 and 10 digits can be selected to suit the user's applications, the vendor said.

The FPP/6800 packages are available on NS5204 and 2708 extended read-only memory chips. Custom formats and licensing for source code are available. The normal packages range from $120 to $360, according to Scipro.

The cross-assembler is written in Fortran IV and may be adapted to any computer with a minimum word length of 16 bits. The assembler accepts Motorola 6800 assembly code with additional features for forming FP constants.

The cross-assembler costs $450, Scipro said from 2600 W. Second Ave., Denver, Colo. 80219.

• Cobol Base Of 'N5500'

CENTURY CITY, Calif. — The N5500 package from Nichols & Co., Inc. is described by the vendor as an efficient project management system designed to effect cost and time savings for its users. Written in ANS Cobol, it can be used with almost any modern CPU, the spokesman added.

An extension of the company's previous Procon 3 package, N5500 provides a range of capabilities including project analysis, simulation, forecasting, project costing and billing and manpower loading, he said.

Dictionary Used

The planning process supported by the package is based on a transaction-loaded dictionary, which may be easily updated, according to Nichols. Improved planning efficiency is also maintained through dynamic load leveling which feeds tasks within projects by set priorities, the spokesman noted.

Automatic resource assignments will select the individual or group that can best accomplish the specific task, and there are nine priority levels available for resource allocations, he said.

Self Starter

Also supporting and enhancing the planning efficiency provided by N5500 is an automatic project-generation facility. This allows for the creation of new projects from existing ones, bypassing all the effort usually required to establish a project under control of N5500, he continued.

The current package produces 20 reports and two output files, the latter interfacing with a graphic plotter and "any in-house system," according to Nichols.

VS Operation Best

It has been implemented in 140K in an IBM 370 environment and functions better under VS than OS, the spokesman noted. Honeywell, Univac and Burroughs sites can also install the package, he continued.

The ANS Cobol source code is available under a 35-year lease plan for $18,500, Nichols said from 1900 Ave. of the Stars, Century City, Calif. 90067.

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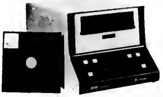

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Panelists Agree

Networks Need User/Carrier Confidence

By Ronald A. Frank
CW Staff

TORONTO — Users must build up a "confidence factor" with their carriers when planning international data networks, according to Charles Gobeil, a former data communications manager with Chrysler Corp.

Speaking at a panel session dealing with telecommunications management at the recent Ifip '77 here, Gobeil said he wanted to dispel the idea that "the user needs a little pot of gold in his back pocket" to get needed facilities from international carriers. "This world doesn't exist anymore," he said.

Robert McEwen-King, telecommunications director for Massey-Ferguson in Great Britain, said the user has to understand the operating rules in the country in which he intends to operate. Then he should contact the telecommunications administration accordingly with requirements that are reasonable.

It is important for a company to establish local telecommunications managers who know how to deal with local problems, he added.

Provide for Standards

Users would welcome more up-to-date standards, but usually they do not keep up with technological change because of the lead time required for standards formulation and agreement, he said. In allowing for changes, users should configure networks with built-in provisions for standards and technology upgrades, McEwen-King said.

Michael Ford, head of international service policy for the British Post Office, called for faster development of standards so that users of international data nets will not have to deal with different telecommunications administrations in each country.

"The user can't continue to negotiate with 15 different bodies," Ford warned his fellow panelists. The pressure of events will force much more rapid development of standards, he predicted.

As a case in point, Ford mentioned the evolving X.7X standard for the international interconnection of public data nets, which he said should be forthcoming "hopefully within a year.

"Many monopolist telecommunications carriers are criticized for their inertia and apparent disinterest in meeting the needs of individual users," Ford told the attendees.

"It is my experience that the truth is far from this. There are groups of specialists . . . who obtain great satisfaction from providing tailor-made facilities for user organizations," he said.

Because of the need to interface with many telecommunications administrations, the necessary staff and technical resources to get into international data nets are only available to the largest users, the panelists agreed.

"I really don't enjoy operating a large network and having to deal with 15 different agencies," McEwen-King said, "but I don't think it will change very soon."

Ford said the user should not expect too much from the carriers he is dealing with. The user is in the best position to deal with the vendors involved in supplying equipment for the network. "It is normal for the user to assume overall coordinating responsibility," he added.

Arnold Scully of Teleglobe Canada agreed with this concept. "The carrier is not in a good position to coordinate data communications nets," he said. Because of the various suppliers involved, the user is in the best position to exert pressure when it is necessary, he said.

Ford cautioned that in many European countries the biggest problem often is transmitting data from the user's office to the local exchange. "Sometimes even moving to the other side of the street can make all the difference," he advised.

Because of these types of operating problems, Ford urged users to select project managers who are familiar with the environments in which service is required.

Comten Front-End Processors Replace 270X and 370X Units

ST. PAUL, Minn. — Comten, Inc. has extended its line of communications processors with a programmable front-end replacement for IBM 270X and 370X processors.

In addition, it introduced what it called an advanced software processing and control system for distributed networking applications and announced peripheral equipment for Comten processors using the software system.

Comten's 3690 communications processor is a modular, programmable unit designed to operate in medium to large networks with IBM 360 and 370 CPUs or as a stand-alone data switching system.

Up to 512 full-duplex communications channels can be attached to the 3690 through 32 modem interface modules, providing the user with an aggregate channel throughput of 15.4M byte/sec for both storage banks within the processor, according to the firm.

The 3690 supports up to eight IBM host CPUs, provides support for IBM and non-IBM terminals and is qualified for satellite communications and advanced data switching networks, Comten said.

As a front-end system, it can relieve the host CPU of many processing functions including line control, polling, addressing, code translation and error recovery, the company added.

It can also operate as an advanced network control processor, performing networking functions, message switching and global control functions under the Comten Data Switching System (DSS), according to a Comten spokesman.

The 3690 is available in five configurations, varying in the amount of storage and other options.

Switching System

Comten DSS is a network processing and control software system that enables the Comten 3650 II, 3670 II and 3690 communications processors to act as front ends, remote terminal concentrators and data switchers, the company stated.

DSS is a group of licensed program products which are compatible with and are said to extend IBM's System Network Architecture (SNA). DSS also supports user applications, allowing them to communicate with host 360 or 370 systems in a distributed processing network.

The first two releases of DSS (Releases 1 and 2) can perform applications processing at the network level and can provide multiple host access for terminals, including IBM 3270 CRTs operating under BSC control, Comten said

(Continued on Page 24)

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Hundreds of Terminals Operating On Datapac

By Ronald A. Frank
CW Staff

TORONTO — Datapac, Canada's packet switched network operated by the Computer Communications Group of Bell Canada, is serving more than "several hundred terminals," according to Andrew McMahon, vice-president.

Datapac was given final authority to begin operations in mid-1977 and at that time there were about 10 host CPUs on the network. For competitive reasons, McMahon said he could not give the total CPUs now on the network, but they include mainframes from Honeywell, Digital Equipment, Amdahl, IBM and Univac.

The objective of Datapac is to relieve the user of the many complex networking functions which must be done in-house to operate private-line nets. As a by-product of this goal, McMahon said Datapac will strive to have total compatibility and interchangeability with major terminals and mainfames.

Host of Applications

Among the applications now on the packet net, McMahon listed banking, trust administration, time-sharing and interactive teletypewriter traffic. In the finance area, it may soon be possible to access any credit data base with any credit card, if current Canadian plans materialize, he said. In this regard, a payments system is projected for Datapac that would link not only banks but also small stores that could do their accounting and credit processing using compatible terminals.

NCR is providing a service bureau operation designed to serve small retailers that have only a few locations. Part of this service includes the NCR 721 communications processor, he said [CW, Aug. 22].

Datapac is now operational in 57 Canadian cities and in addition, Bell Canada has agreements with CNCP to serve users in areas not covered by Bell.

Discussions have been held with regard to establishing Datapac connections with similar packet nets in Europe, but right now there does not appear to be a great user demand for that type of service, McMahon said.

An interconnection between Datapac and U.S. nets such as Telenet has higher demand from users and will probably be the next goal in widespread interconnections of packet networks. The best standard for packet operation and the one which appears to have the most support from standards groups is the X.25 protocol approved last year by the CCITT, McMahon said.

Comten Unveils 370X Front Ends

(Continued from Page 23)

Both releases of the software can also perform message handling, message switching, network security, statistics accumulation and maintenance aids for isolating and correcting system problems.

In addition, DSS Release 2 can support the new peripheral equipment, including Comten disk systems, magnetic tape systems, card readers and a line printer.

Peripheral Equipment

Comten disk drives feature a storage control unit with either fixed or removable media drives.

The fixed-media drives provide storage capacities of 24M- or 48M bytes. The removable-media disk drives provide storage capacities of 150M- and 300M bytes.

The company's magnetic tape drive consists of a magnetic tape unit and controller in one cabinet, the company stated.

The Comten card readers can read 80-column cards at speeds up to 600 card/min (Model 7305); the Model 7306 can read up to 1,000 card/min.

Comten also introduced the Model 7406 line printer, which can print at speeds up to 600 line/min at a density of 136 char./line.

Prices, Availability

The 3690 and DSS Release 1 processor will be available in the first quarter of 1978. DSS Release 2 and the peripherals are scheduled to be available in the fall of 1978.

A basic 3690 will cost $92,900 or $2,991/mo.

DSS licensed programs will have monthly license fees ranging from $250 to $450, Comten said from 1950 W. County Road B-2, St. Paul, Minn. 55113.

Micom Line Drivers Eliminate Data Sets

CHATSWORTH, Calif. — The Micom 410 asynchronous line drivers are designed for short-haul, in-house data transmission at distances from one to 12 miles over twisted pair cable.

Two versions are available: the Dumb Driver and the Smart Driver. Both are designed to operate in full-duplex mode at speeds to 9,600 bit/sec.

In addition, the Smart Driver version provides Bell 113A/113B-type simulation of all dial-up handshaking sequences, the company claimed.

The Micom 410 costs $150 for the dumb version and $185 for its smart counterpart, the company said from 9551 Irondale Ave., Chatsworth, Calif. 91311.

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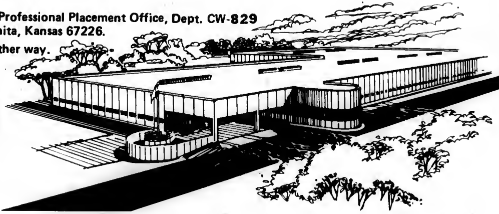

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Monitor Works With IBM 3277-2

SEATTLE — The Model 277 hardware monitor from Temco Products here is designed to capture and display the number of transactions passing through an IBM 3277 Model 2 terminal and also display each transaction's response time.

Power for the monitor is supplied by the terminal. The transaction and response time information, however, is displayed with zero system overhead, Temco claimed.

There is no increase in the attached terminal's response time because of the monitoring activity, the company added.

The 3-in. by 5-in. by 1-1/4-in. monitor has two constant LED readouts and a display reset and is attached to the terminal by internal connections.

The 277 monitor will not alter users' maintenance agreements with IBM for the 3277-2s, because none of the terminal's internal circuitry is altered, a spokesman explained.

Temco's response time and transaction monitor can also be used to monitor operator performance and costs $350, trom 2150 N. 107th, Suite 110, Seattle, Wash. 98133.

Penril Has LSI Modem To Replace Bell 201s

ROCKVILLE, Md. — The Data Communications Division of Penril Corp. has introduced a 2,400/1,200 bit/sec synchronous LSI modem.

The 2400 LSI is designed for 1,200- or 2,400 bit/sec operation over two- or four-wire dedicated or dial networks.

The modem employs a four-phase modulation technique conforming to CCITT Type A or B and is on-line compatible with the Bell System 201B or C data sets and most other PSK modems, as well as the Bell 801 automatic calling unit.

It features fast synchronization for use in multistation polled networks and point-to-point applications, Penril stated.

The 2400 LSI is equipped with an equalizer that is strappable in either the transmit or receive sections the company said.

Strap options are provided for selecting transmitter output levels, carrier detect level, internal or external clock carrier detector response time, RTS/CTS delays and equalization, it noted

When operating over the direct-distance-dial network automatic answer circuits enable unattended call answering when connected via a CBS or CBT-type data coupler

Built-in local digital and analog loopback diagnostic capabilities reduce the time required to localize system malfunction, Penril added A built-in test pattern generator and receiver pattern detector simplify on- and off-line testing and troubleshooting

No external test equipment is required to install or troubleshoot the 2400 LSI, which costs $795 for dedicated lines, according to Penril at 5520 Randolph Road, Rockville, Md. 20852

Datapro Seminars Slated for Users

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Each course costs $425 for current Datapro subscribers and $475 for nonsubscribers and will be held in Philadelphia, Washington, D C, San Francisco, and New York, Datapro said

The research firm can be reached at 1805 Underwood Blvd., Delran, N J 08075

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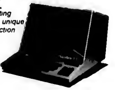
Hazeltine 1510

A buffered editing terminal with a unique concept in function keys



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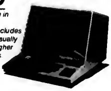

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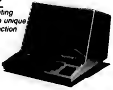

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Datapro Reports On OCR

By Frank Vaughan
CW Staff

DELRAN, N.J. — Datapro Research Corp. here recently published a report, "All About Optical Readers," in which 85 optical mark reader (OMR) and optical character recognition (OCR) users evaluate their equipment. In addition, the report includes comparison charts listing the features and prices of 71 optical readers from 34 manufacturers.

The report examines the current technology and concludes "OCR is as mature, or more mature, than any technology in DP, and the machines have always been very reliable." The stigma or unreliability must mainly be attributed to the actions of "over-zealous salesmen" or to the "naive DP manager," it said.

Looking at the current role of OCR, Datapro observed that OCR has a definite niche within data entry operations, and the report encourages knowledge and understanding of OCR as "an alternative means of data entry."

The report also examines the reasons behind — and difficulties caused by — the lack of a "standard" OCR equipment design. It also explains why there is no such thing as the standard OCR document, what companies usually want when they look toward OCR.

For the user's ratings portion of the report, Datapro summarized and averaged responses to a survey taken in February. Equipment was judged in the areas of overall performance, ease of operation, reading reliability, document handling reliability, document design flexibility, ease of job changeover and maintenance service.

The report costs $12 from the firm at 1805 Underwood Blvd., Delran, N.J. 08075.

80% Savings Claimed

One-Step System Processes Remittances

By Edith Holmes
CW Staff

WASHINGTON, D.C. — Computer-Link Corp. introduced a one-step remittance processor at the recent OCR Users Association meeting here and promised that the standalone unit will reduce the payment processing costs faced by businesses by between 80% and 90%.

Called the SORC/800, the remittance processor contains Digital Equipment Corp.'s LSI-11 microcomputer with a 32K-word memory and contained communications capability.

The device is further self-contained in that it includes dual diskette drives, an interactive CRT display with 240 characters and alphanumeric operator instructions, a keyboard, an optical character recognition (OCR) scanner, a punch-card reader, an audit trail printer with 200 alphanumeric characters and a programmable check endorser, the firm said.

In one operation, the SORC/800 can process over 1,000 payments per hour at a cost of under 2 cents per payment — approximately 6 cents less per transaction than the batch remittance-processing method, the company added.

The unit can handle almost any style of multiple documents that must be simultaneously processed with fixed or variable information from a single document, including insurance premiums, loan payments, credit card payments, bank-by-mail, subscriptions, deposits, tax payments, monthly installments and mortgage payments, Computer-Link stated.

SORC/800 automatically inspects and compares the amounts of bill payment stubs with checks, reconciles the amounts and inscribes an audit trail. It endorses and separately batches both bills and checks, then produces payment records and deposit slips for transfer to the bank, a spokesman for the firm said.

The device will accept documents from 2.7 in. to 5 in. high and 4 in. to 9 in. long, as well as American Bankers Association (ABA) standard checks, and 16-pound to 32-pound paper and card stock, Computer-Link said.

Micr Inscriber

An ABA Magnetic Ink Character Recognition (Micr) inscriber required for automatic processing of endorsed checks is another SORC/800 feature.

The OCR scanner included in the device reads OCR-A alphanumeric, OCR-B, 407, 1403 Standard .095, 1428, E-7B, E-13B, E-12F, punched cards and hand print fonts, the firm stated.

Selling for between $32,000 and $37,000 depending on the kind and type of scanning required, the SORC/800 is available from Computer-Link at 14 Cambridge St., Burlington, Mass. 01803.

In-House Systems Best Choice For Fast-Growing Credit Unions

By John P. Morgridge
Special to CW

The in-house, general-purpose computer system offers a number of advantages to a large, expanding financial institution such as a credit union. Use of outside commercial service bureaus or of software houses/system builders on the other hand, has serious disadvantages for growing credit unions.

An increasing number of the nation's approximately 22,600 credit unions are studying their current and future DP needs. The business has seen an annual growth of nearly 15% per year since 1970, making it the fastest-growing segment of the U.S. banking and credit community.

As this business grows, the demand for additional member services grows even faster. Share drafts, loan drafts, preauthorized lines of credit, variable-interest-rate savings plans, 12-year unsecured loans, 30-year home mortgages, traveler's checks and money orders are now authorized, and legislation allowing unions to issue credit cards has recently been signed into law by the President.

Credit unions have three options for satisfying their DP needs: to purchase DP services from a commercial service bureau: to purchase a special-purpose system from a third party such as a system builder or software house: or to lease or purchase a general-purpose computer system for in-house use.

While service bureaus offer ease of entry to DP for smaller credit unions with no DP experience, and while third-party special-purpose systems can provide satisfactory solutions in certain situations, the in-house, general-purpose computer system offers significant demonstrable advantages for the larger credit unions.

Ease of Growth

Most service bureaus can accommodate their client's growth, but each workload increase results in a parallel cost increase. Since service bureaus itemize charges by account, transaction, report and so forth, each time the workload doubles, the service bureau billings also normally double.

Most computers obtained from software

(Continued on Page 28)

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In-House Route Best for Large Credit Unions

(Continued from Page 27)

houses or system builders are tailored to an assumed workload. Although some expansion ability is normally built in, when the expansion limit is reached, the credit union would need to purchase a second system (doubling its investment) or purchase a larger system and attempt to dispose of its outgrown equipment.

I recommend general-purpose computers purchased or leased directly from the manufacturer because they are highly modular. First, a user can add functions, increase capacity and even accelerate internal operations without replacing the CPU.

Second, field-installed upgrades are fast and economical. They can usually be installed between shifts.

Third, the workload can double and redouble with only moderate cost increases and without making the computer obsolete.

And fourth, even if the rapidly-growing credit union outgrows its general-purpose system, upward compatibility protects its investment in programming, applications and training when moving up to a larger system.

Software is the key to harnessing the power of the computer for constructive tasks.

The disadvantage of service bureaus is that they offer a fixed software capability. The same functions are performed the same way for all credit unions and it is difficult and expensive to modify software needs of individual users. In addition, service bureaus are unable to generate special one-time reports on demand, and new applications are limited to the service bureau's offerings.

While somewhat more flexible, specialized third-party offerings from systems houses come with limited software custom-tailored to existing applications. The hardware/software offerings are the same for all users in a given industry. Adding new applications, if possible, involves a major additional investment with the system supplier.

The User's Choice

Conversely, major computer manufacturers offer a wide selection of systems and applications software. The user has a choice of easy programming languages for inexperienced programmers or powerful languages for increasing sophistication.

The general-purpose system has extensive facilities for data management, communications with branch offices and utility functions. And new applications can be programmed in-house (with vendor assistance if you desire), obtained from a vendor or exchanged through users' trade associations. As credit unions expand, they need this easy, inexpensive access to new services applications.

The in-house system allows the user to control work schedules and priorities, avoiding service bureau drawbacks such as dependence on the service bureau's schedule and competing customers, reliance on complex communications links to large, distant service bureaus, or transportation of data to and from small local service bureaus. It also allows the user to retain its confidential files in-house where security is easier to control.

And finally, it should be remembered that large, established manufacturers have long-standing commitments to the DP industry. They offer strong financial resources and large research and development budgets for solving customer problems.

Morgridge is vice-president for General Systems Operations at Honeywell Information Systems, Inc.

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370/158 Add-On Debuts

BEDFORD, Mass. — Cambridge Memories, Inc. (CMI) has introduced an add-on memory system for IBM 370/158 CPUs that reportedly increases the main storage capacity to 16M bytes.

The Stor/158-4 permits the attachment of 16M bytes of storage to uniprocessor, multiprocessor or attached processor versions of the 158 Model 1 or 3, he said.

IBM has memory limits of 4M bytes and 6M bytes respectively for the uniprocessor versions of these models and limits of 8M bytes and 12M bytes for the multiprocessor versions.

No software changes in the 370/158 are needed to accommodate the add-on memory, CMI claimed. The memory sells for approximately $110,000 per megabyte. CMI is at 12 Crosby Drive, Bedford, Mass. 01730.

3M Introduces Four Disk Packs

ST. PAUL, Minn. — The 3M Co. here has introduced four disk packs for specific disk drives.

The 934 disk pack is designed for the Burroughs Corp. B9484-4, B9485-4, B9486-4, B9489-8 and B9383-6 disk drives. With a track density of 200 track/in. and a bit density of 4,400 bit/in., the 934 offers 8,120 track/pack and has a maximum capacity of 121M byte/pack, according to a spokesman. The 934 sells for $375 each.

The 935-0 was designed for the Calcomp 225 disk drive and the 935-32 was engineered for the Univac 8440 disk drive. Both packs offer 220 track/in. and 4,400 bit/in. providing 8,120 track/pack and a maximum capacity of 116M byte/pack. The packs sell for $450 each.

The 949/40, designed for the Control Data Corp. 9760 and Ampex Corp. DM940 disk drives, is a soft-sectored pack with 192 track/in. and 6,038 bit/in. There are 404 data track/pack and a nominal capacity of 40M byte/pack. It sells for $325 per unit, the spokesman said.

All 3M disk packs offer Crashguard disk coating which protects against damage and headcrash, the spokesman added. 3M can be reached through P.O. Box 33600, St. Paul, Minn. 55133.

Sycor 440s Get Printer Option

ANN ARBOR, Mich. — Sycor, Inc. has enhanced the peripheral flexibility of its 440 series of distributed data entry and processing systems by enabling cable-connected serial printers to be located up to 2,000 feet from the CPU.

The "distant printer" feature allows one or two Sycor Sprinter bidirectional serial printers to be remotely cable-attached to a 440 system, according to a spokesman.

The distant printers can be field-installed by adding a special I/O feature to the 440 control unit, he added.

The distant printer option costs $500 plus the cost of the cable from the firm at 100 Phoenix Dr., Ann Arbor, Mich. 48104.

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For Better Patient Care

Minis Facilitate Prescription Control

MONTREAL — Three minicomputers linked to several micros at remote locations are helping RX Information Center Ltd. here provide better patient care, according to the user.

The DP center was formed to acommodate the needs of Jean Coutu Pharmacies, a retail chain; Farmic, a pharmaceuticals distributor; and Casgrain and Charbonneau, manufacturer of pharmaceuticals and medical supplies, The minis are located at Casgrain and Charbonneau's head office here.

The system provides on-line prescription retrieval and creation at each pharmacy as well as on-line receipt/labels with directives for each prescription entered. Drug allergy warnings, doctor look-up and verification and comprehensive renewal controls are also provided.

The system also keeps a patient history of prescriptions, allergies and drug interactions as well as personal patient data. Automatic pricing and production of welfare and other government reports is also provided. Along with this, the system provides a comprehensive business program for the pharmacies' accounting and statistical applications.

"To expect any supplier to accommodate these requirements, I had to provide a comprehensive request for proposal," Robert Dionne, General manager, said.

After months of analysis and then subsequent evaluation of all proposals, Dionne made his choice. "I was looking for the best price/performance in hardware, but not having my own programming staff, I also needed either a software subcontractor or a supplier who would be totally responsible," he said.

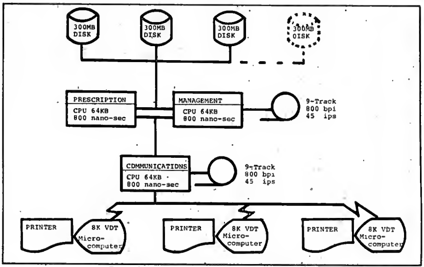
Cygnet Minicomputers Ltd., a Montreal-based minicomputer vendor, was selected for the complete hardware and software implementation. Knowing full well that this was a specialized system and it would be difficult to project terminal response times, Dionne insisted on hardware and software performance guarantees before the work began. A maximum four-second response time was specified.

Paperwork Cutbacks

Now that the system is running, RX expects to cut costs and time in the paperwork side of prescription processing and to improve customer service. Prescriptions are prepared through a microprocessor-controlled visual display with a Centronics Data Computer Corp. 306C printer attached.

The data base at the central site retains all prescriptions for a period of two years (inactives are automatically deleted from the system). Patient profiles and prescription re-

(Continued on Page 32)



RX Information Center's Distributed System

Mini Bits

Meet to Explore Office Automation

SAN FRANCISCO — A conference for those considering combining word processing and DP in their offices will be given by the American Institute of Industrial Engineers (AIIE) in two cities this fall, winter and spring.

The first day will include a survey of functions and systems of the automated office, the organization said. On the second day, concurrent workshops will examine word and text processing technology and systems and DP, software and communication technology trends influencing office automation equipment. They will also cover selected case studies.

The conference will be given here Sept. 28-30 and in Washington, D.C., Dec. 7-9 and March 13-15. It costs $265 for AIIE members, $295 for nonmembers and $195 for teams. Information is available from the organization at P.O. Box 3727, Santa Monica, Calif. 90403.

Floppy Gets Bootstrap Loader

SANTA CLARA, Calif. — Data Systems Design's DSD 210 Digital Equipment Corp. compatible floppy-disk system has been enhanced with the introduction of a hardware bootstrap loader.

The bootstrap capability allows a DEC PDP-11 or LSI-11 user to load RT-11 from the diskette unit with a single command. The bootstrap instruction sequence is contained on a programmable read-only memory which is a part of the DSD 210 interface, the firm explained.

The DSD 210 including the bootstrap feature is available 30 days after receipt of the order and costs $3,295, the firm said from 3130 Coronado Drive, Santa Clara, Calif. 95051.

Printers Interfaced to PDP-11

AUSTIN, Texas — Houston Instrument has interfaced its 8200 series line printers to Digital Equipment Corp. PDP-11 minis through the use of a DEC Unibus compatible interface and cable, the firm said.

The interface mounts in a four-slot wide card position in the mini. It contains all the logic and hardware necessary to control the printer and respond to the Unibus commands, according to a spokesman.

The interface option costs $1,150. The 80-column 2,400 line/min 8210 printer costs $3,450 and the 132-column 1,400 line/min Model 8230 printer costs $3,785, the company noted from One Houston Square, Austin, Texas 78753.

Small System Tracks Beer, Wine

By Esther Surden
CW Staff

GRAND RAPIDS, Mich. — Wine and beer, although similar in alcoholic content, are quite different when it comes to keeping track of orders and inventory.

This, combined with the increasing complexity of a business that must abide by tough state and federal regulations, prompted Kent Beverage here to seek help through purchasing a small business system.

The firm is a beer and wine wholesaler with about 560 accounts, according to its president, Larry Gary.

"Wine is usually a presell inventory, which can be kept on the computer. The system generates a picklist and the wine is directed to the correct customer," according to Kevin Gary, general manager in charge of the small system.

Beer is a direct-sale item so it is necessary to keep a truck inventory log over age of a consigned item. The beer salespeople make direct sales and receive cash. After the cash is brought to Kent headquarters, it is counted out manually and the resulting numbers are input into the mini via a CRT terminal. The system cost-verifies the amount and prints out a sales analysis, Gary said.

Increasing complexity in the alcoholic beverage business prompted the firm to look for a small system, the general manager said. "There are a huge number of laws wholesalers have to follow. For example, we have to keep seven years of data storage and you can imagine the size of the data file."

Both Garys looked at several systems before choosing their present model, Keven Gary noted. Cascade Data, Basic Four Corp., Litton, Burroughs Corp. and IBM all were contacted, and the company looked at several on-line service bureaus. "But I was not satisfied with any of the programs," Gary said.

He explained he was looking for an application package that would completely take care of his problem. The general manager had taken several computer courses in college and knew what his firm needed in a software system.

Finally, the wholesaler contacted a neighbor who happened to be a distributor for Randal Data Systems, Inc. The neighbor's firm, Minicomp Systems, Inc., was willing to write the basic programs and Gary decided to write the rest, using his

(Continued on Page 33)

Definitions Sort Out Chip Memory Functions

BOSTON — Almost everyone in the computer industry would agree that minicomputer memory technology is changing rapidly. No sooner did the mini move from core to large-scale integration technology with its plethora of read-only memory (ROM), programmable read-only memory (Prom), random-access memory (RAM) and erasable programmable read-only memory (Eprom) chips than it began looking toward charge-coupled devices and bubble memories on the horizon.

Where are we today? Bogged down in a quagmire of acronyms and buzz words, with even the most sophisticated user seeking a simple explanation for these abbreviations. In response to several reader requests, CW is presenting a few of these definitions as they appeared un a catalogue designed for hobbyists and compiled by the Computer Warehouse Store.

Memory can be grouped into two major categories — read-only memory and read/write memory (misnamed random-access memory). Both categories of memory are actually random-access; that is, any address may be immediately accessed.

ROM — The process for making ROMs requires the creation of an expensive mask, but copies of the ROM are themselves inexpensive. This means that for large volumes the ROM is ideal.

Any ROM is nonvolatile; that is, it keeps its memory contents even when the power is shut off. This makes it extremely valuable as a bootstrap for setting a system started from a power-up condition. It is also used extensively in the simple monitors that permit a user to examine, modify and run programs in memory. The user may not change the contents of the ROM.

Prom — This is a special memory which can be programmed using electrical means. It does not require the expensive mask process but, once programmed, it performs exactly as an ROM. It is reasonably inexpensive in small quantities and makes a good memory for low volume systems.

Eprom — As the name implies, this is a Prom that can be erased and reprogrammed. It costs more than the Prom, but with the capability of being erased and used over again, it may actually be cheaper to the hobbyist or during system development.

RAM — The microcomputer always needs some memory that it can alter to maintain data. For certain applications, the amount of RAM memory may be extremely small, perhaps only a dozen or so bytes for a dedicated instrument or simple process-control system. Other applications may need tremendous amounts of read/write memory, thousands of bytes, to hold both programs and data.

The advantages of RAM memory are that it can be modified by the computer and it can hold data and programs. The disadvantages are that it is more expensive than the ROM types of memory since it requires write circuitry as well as read circuitry, and it is volatile; that is, it loses its contents when power is turned off or is seriously interrupted for a brief duration.

Minis Expedite Prescriptions

(Continued from Page 31)

cords are retrievable by the prescription number or by a combination of surname and birth date. A prescription is accessible, regardless of where originally created, by any drugstore in the network.

One print cycle produces the label for the vial directions, a three-part customer Medicare receipt, a laboratory file copy and a cashier's stub. The construction of the form alone, with hardware modifications to the printer, took Dionne, Centronics and Paul Finlayson of Cygnet V.P. Systems three months to complete.

Communications Lines

The network extends from Montreal east to Sherbrooke, north to Lac St.-Jean, west to St.-Jovite and south to Valleyfield. Polled multidrop, private and Dataroute 1,200 bit/sec telephone lines are used for communications.

Central-site hardware consists of four identical Cygnet Series 2002 minicomputers. Three are used as prescription CPU, management CPU and communications CPU. The fourth is redundant and serves as backup to any of the others.

Disk Drives

Disk drives are 300M-byte Ampex units dual-channeled to the prescription and management CPUs. Failsafe procedures have been implemented through a magnetic tape audit of all transactions processed during the day.

"In fact," Dionne said, "with the redundant hardware plus the fact that two CPUs can handle the total requirements with only a degradation in response, we have the ultimate in backup security."

Three hundred line/min, OCR-A-font chain printers serve the government welfare reporting. Reports are prepared during the evening and forwarded to the individual pharmacies on a daily basis. The average number of prescriptions processed daily by a pharmacy ranges around 500.

How to jump into key-to-disk, without giving up your

Granted, key-to-disk equipment does good things for data preparation in high-volume applications.

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Bar-Encoded Labels Simplify Librarians' Duties

By Joyce Kamanitz
Special to CW

NEWTON, Mass. — Although bar-encoded labels have run into problems in some applications [CW, May 30], they are well-suited to library applications.

In fact, libraries across the U.S. and Canada have been using bar-encoded label's since 1972 to identify their patrons and books.

Promptly dubbed "zebra labels" by the librarians, the labels help the library's minicomputer turnkey system keep track of the books in each collection and prepare reports on the collection's usage.

The system works as follows: Every library patron receives a zebra label on his library card that uniquely identifies him to the system. Each book also has a zebra label attached to it.

To perform a checkout, the librarian simple reads the patron and book zebra labels with an optical scanner to make the connection between the two for the duration of the loan period. For checkins, the librarian scans the book's zebra label and the system removes the connection.

Behind the scenes, the system checks for conditions that formerly took hours to determine, if they were checked at all.

For example, by identifying the title connected to the zebra label, the system can tell if any holds have been placed on a book presented for checkin.

If so, the system notifies the librarian and the book is set aside to be picked up by the next patron who has requested it. The system then sends a notice to that patron informing him the book has been returned.

Library staff and patron reactions have been very favorable because this combination of minis and bar codes makes checkout and checkin faster and more efficient. Scanning the patron's zebra label instructs the system to examine the patron's borrowing status. Thus, the librarian knows immediately whether the patron requesting a book has exceeded the library's delinquency thresholds.

The librarian then determines whether to allow the patron to check out the book, thus rewarding borrowers who follow the rules and warning those who don't that privileges may be denied.

Without the on-line access to the data base facilitated by the zebra labels., the librarian does not have the patron's borrowing status readily available.

As part of each checkout, the system updates the circulation count for the type of patron and the type of book in the transaction. Librarians thus determine the types of books being circulated and the level of usage by patron groups. With these statistics, the librarian can ensure that the library purchases the kinds of books its patrons want to read.

The first part of the patron and book zebra labels is a library code. When the librarian scans a zebra label, the system always knows the branch at which the patron is registered and the branch which owns the book.

In library systems that honor branch libraries' cards, this feature enables the system to automatically keep track of the number of checkouts to patrons of cooperating libraries and to immediately identify any books erroneously returned that belong to other branches.

Bar-encoded labels in the library application have not run into the problems facing other applications, notably the supermarket systems.

Since item pricing is not an element of normal library transactions, objections based on item pricing do not apply.

Kamanitz is a technical writer with CL Systems, Inc., a turnkey library system vendor in Newton, Mass.

System Tracks Inventory Flow

(Continued from Page 31)

computer training. "I realized that no one really had a package for beer and wine distributors, so price dictated that we get this system," he said.

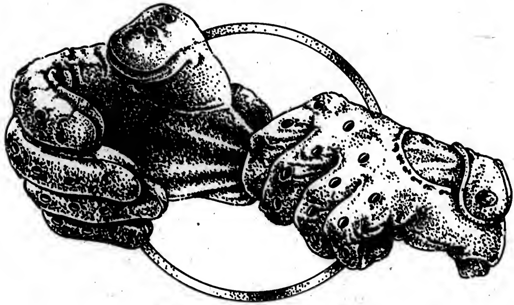
The system includes a 70 line/min printer and floppy disk. Although one CRT is presently used on the system, Kent has another on order and has decided to switch to hard disk for more capacity. The switch requires a CPU upgrade, he noted, Initial cost was $17,000.

The firm doesn't have a hardware maintenance contract with Randal, Gary noted, because he chose to do all the maintenance himself. "The Randal equipment is as good as any other piece of hardware. Downtime has been only 1/4%," he stated. The only problem the firm has had was a burned out printer motor. "Service is fantastic — we get spare parts the next day."

Because the system is located in a high dust area, "I installed our own filters around the compressor," Gary noted.

He programmed the system in Randal's Basic, which includes some variances that make the language simpler to use in writing programs, he said.

Data Base/Data Communication



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Orderly Selection Route Ensures Best Decision

By Joseph Dresnok Jr.
Special to CW

NEW YORK – "How can we expect to merchandise in a constantly changing environment when our 'most current information' is 45 days old?" is a question asked by many small businesses.

The problems are easy to define: inaccurate sales and inventory informtion, reports so late that they are virtually useless and lack of control of the information by users head an uncomfortably long list.

Seligman and Latz, Inc., a company dealing in beauty services and products, needed to implement a solution for these problems which would serve the distribution function for the cosmetics and beauty salon products divisions, as well as provide merchandising information for the fine jewelry division. The solution had to be tailored to the varying capabilities and specialized requirements of each of the three divisions to be served.

To organize the decision process, a hierarchy was developed. After documenting "musts" and "wants" from the users, the decision hierarchy became:

- Identify the optimum mode of operation (batch, remote batch, on-line).
- Specify hardware type (mainframe, minicomputer(s), data collection devices).
- Select the communications method (if appropriate).
- Evaluate vendors and recommend one.
- Determine the organizational structure that optimizes successful implementation probability.

At each decision level in the hierarchy, top management was involved with the intent of gaining its insights and obtaining concurrence. We quickly realized that involved, well-informed corporate management would be an invaluable asset in reaching an optimum solution. Budget revisions, when necessary, became intuitively obvious to everyone involved in the decision process.

Based on the first-level decision, the minicomputer was selected as the hardware type. The necessary larger mainframe would have exceeded the acceptable cost limit and data collection devices could not satisfy the on-line requirement selected in the prior decision level. A cost evaluation to corporate management detailed the reason for the decision to use minicomputer capability.

The communications mode selected was 9,600 bit/sec leased lines on the basis that the number of sites is limited and the transaction volume is high.

The minicomputer vendor evaluation became the most difficult part of the investigation. Again, "musts" and "wants" were identified, this time by the management level of the MIS department. "Musts" included the following:

- Ansi Cobol capability to maximize in-house programming capability with a minimum of retraining.
- Data base file handling techniques to optimize the access and utility of data by the users.
- Single source responsibility from the CPU manufacturer to limit the "finger-pointing" anguish to the CPU vendor and the telephone company.

RFP Questionnaire

An RFP was developed which included a hardware and a software questionnaire. Sent to seven major vendors, one submitted a "no bid" and one exceeded the acceptable cost limit (which was now broken down by hardware, system software and applications software.) Of the five remaining vendors, only two were able to meet the "musts." The final evaluation was performed on the basis of two separate rating schedules.

The final decision in the hierarchy was to determine the best organizational structure for implementation. Based on our environment and the importance of timely installations, the project team approach was selected.

It is important to note that many of the alternatives that were not selected were reasonable and would have offered many advantages. In retrospect, we are pleased with our decision and have received the endorsement and cooperation of top management.

Dresnok is director of systems at Seligman and Latz, New York, N.Y.

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Mini Computers & Small Business Systems

A Computerworld Special Report

Edited by Esther Surden

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Small Processors the Answer

Firm Uses Net to Solve 'Saturation' Problems

By David Langley
Special to CW

VANCOUVER, B.C. — In 1974, Finning Tractor and Equipment Co. had a critical DP problem.

The company, a heavy equipment dealer, maintained a parts inventory worth $15 million — some 250,000 different line items — at full service branches and depots throughout British Columbia and the Mackenzie Valley region of the Northwest Territories, from the Canadian/American border to the Arctic Ocean. Processing 3,300 orders per day and servicing such a vast territory caused a formidable logistics and DP problem, specifically for DP manager C.A. Harris, who recognized the "saturation point" had been reached on the company's Honeywell 2040-A batch processing system.

So the task of investigating the DP solutions to this problem was undertaken. Front-ending the Honeywell system with a communications processor, perhaps a minicomputer, was one of the first avenues explored, but the ensuring operational upheaval and software conversion diminished the attractiveness of this approach. The Honeywell solution at that time was also limited to fewer terminals than the 100 — both CRTs and line printers — that Finning wanted.

A second approach was a traditional "upgrade" one, and large-scale processors from Honeywell, IBM and Digital Equipment Corp. were evaluated. However, Harris felt this route would merely establish another "saturation point" further down the road and was not sufficiently flexible to accommodate a variety of future plans. Neither proposal adequately addressed the problem of on-line system reliability, he said.

The eventual decision was that a network of small processors coupled with the appropriate software tools would provide the most effective solution and at a fraction of the cost of a large mainframe system. Data General was selected as the primary supplier (DEC provided the remote terminal printers) primarily Harris said, because of the price/performance characteristics of the Eclipse and Nova processors and the availability of an extensive data base file management system, Infos.

Experienced Design Team

The major supplier having been chosen, Harris then established a special "computer systems design group" to develop and maintain software products to support the envisaged network. Doug Dyment, former vice-president and software designer for Data General Canada, is manager. Another senior member is Michael Haines, former Data General systems programmer. This group, building on their experience, provided a "margin of safety" that practically ensured the success of the most critical portion of the project, Harris stated.

The network currently utilizes 29 processors, six of which communicate over a DG high-speed data channel link installed at the central site in Vancouver. These local processors — two 256K-byte Eclipses (C330, C300) and four 64K-byte Nova/3s — are used to support the data base, most application programs, training and develop-

(Continued on Page S/6)

Mini Acquisition Seen Serious Step

By David Hyatt
Special to CW

The process of acquiring and implementing an effective business minicomputer does not have to be quite as mysterious as users have been led to believe. Justifying, selecting, manning, installing and converting to a business minicomputer can be a manageable experience.

One of the most abstract and most difficult questions to answer is: "How do I know if I need a business minicomputer?"

One important, practical way to know is if the competition is automating and is able to underbid the company on contracts; then maybe a business minicomputer can help.

Business minicomputers are designed prinicipally to serve the business DP needs of small companies. In addition to their use in small companies, low-cost business minicomputers are also being used in some of the nation's largest corporations for:

- Local processing for branch offices or divisions.
- "Dedicated" applications such as accounts payable.
- "Intelligent terminal" applications as part of a data communications network.

Feasibility Study

The process of investigating, selecting and installing an in-house business minicomputer, if done carefully and correctly, will be time-consuming and costly. Therefore, don't take on these activities lightly and casually. A wrong decision can virtually ruin the internal administrative functions of the organization and have serious financial consequences as well.

As part of the feasibility study, the user should survey the available equipment from appropriate computer vendors that are likely to be able to satisfy the requirements. The user will probably find out there are a number of different approaches to solving the same problem.

One vendor may offer magnetic striped ledger cards as a method of data storage. Another vendor may say that ledger cards are a thing of the past and too slow and offer magnetic tape cassettes as an alternative.

Obviously, there are pros and cons to each. For example, while ledger cards are slower than tape cassettes, they do offer an immediate history of an account. On the other hand, tape cassettes can be sorted in various ways.

The first step in the process of investigating any new computer is to perform a careful audit of current operations and all the procedures taking place now. Time should be spent on defining reporting requirements, specifying application areas, determining data volume and identifying time constraints.

Typically, a variety of minicomputer representatives will be more than willing to make "surveys" of the present accounting functions. There's nothing wrong with accepting their offers, as long as the user recognizes their obviously biased viewpoints.

While investigating the present workload is essential, another very important element to investigate is any future DP requirements of the company. The system should provide some growth capability.

In order to get serious with a vendor about obtaining equipment, the user must have a proposal. In order to obtain proposals, the user must document his needs in a Request for Proposal (RFP) after the careful analysis of the workload and preliminary survey done earlier.

After receiving the competitive proposals, the user should evaluate them with four objectives in mind: Is the proposal complete? Is the information valid? List any questions and sum-

(Continued on Page S/8)

32-Bit Word Machines May Dominate Future Market

By Jean J. Bartik
Special to CW

Several years ago, when CPU hardware was the major consideration in the overall cost of a computer system, the short word length made sense. The short word length meant less hardware, thus less cost.

Today, however, the CPU hardware represents an ever smaller portion of system cost — overshadowed by the cost of memory, peripherals (big disks and fast magnetic tape) and software.

The traditional limitations of minicomputers — narrow address space, small maximum memory capacity, low precision and limited instruction set — were largely related to the short word length. These limitations gave users considerable grief when most programming was done in Assembler language.

This is no longer true. Most programming today is done in a higher level language — Fortran, Cobol, PL-1, APL, Basic, RPG-II. Furthermore, the short word length (and its problems) in the popular older minicomputers is largely hidden from the user behind large amounts of software.

The OS-8 operating system and the hefty software it supports make the 12-bit word length of Digital Equipment Corp.'s PDP-8 irrelevant for most users, who are concerned only

(Continued on Page S/12)

On the Inside

Firm Uses Net to Solve 'Saturation' Problems S/2
Mini Acquisition Seen Serious Step S/2
32-Bit Machines May Dominate Future Mart S/2
Foreign Office Effectively Combines Minis, T/S S/3
In-Depth Analysis Leads Insurer to CA Minis S/3
Comparative Data Can Be Misleading, Costly S/4
Independent Language Speeds Century Programming S/5
Mini-370 Link Streamlines Hospital Lab Work S/7
Mini Helps Auto Parts Company Hike Sales 400% S/10
Micros Helping OCR, Minis Perform Together S/11
Large Mini Realistic Alternative to Mainframe S/13
Photo Studio's Mini Puts Production Into Focus S/15
System Saves Farm Coop $650/Month S/15
Inventory System a Lifesaver for Marine Firm S/17
Low-Cost Peripherals Needed to Fill Micro Gap S/24
Magnetic Media Prevail in Microperipheral Area S/25
Small System Unbundling Eroding User Rights S/26
Turnkey System Turns Around Accounting Woes S/27

Foreign Office Effectively Joins Minis, T/S

By James A. Harper
Special to CW

DENVER — When corporate headquarters of Johns-Manville Corp. (J-M) cut the time allowed for monthly accounting closing processing from 12 work days to six for its European operation, a new DP solution had to be found.

That solution combined extensive use of minicomputers with a time-sharing service bureau.

The J-M European operations, located outside of Paris and including the Middle East and Africa, began using a service bureau in France in the late 1960s to do payrolls, sales and sales reporting and cost of sales for the UK, France, Germany and Italy, as well as general accounting for the UK and France. The operations experienced significant growth, added new facilities and the business became more complex.

The service bureau facilities could not respond to the needs of the production people nor to the increasing demands made by marketing or finance. The final blow came when corporate headquarters here in Denver cut the time allowed for monthly accounting closing processing.

Assumptions, Objectives Compiled

An Information systems program was established in 1974 and began with my arrival in Paris on May 1. Our first task was to interview management at all levels to determine how they ran their business, what information they considered critical in the running of their areas of responsibility and what they felt the future would bring in terms of their responsibilities.

The system objectives were to provide all levels of division management with the information they determine to be necessary to plan, control and measure the activities within their responsibility in the most timely manner.

The service should gracefully respond to new demands for information or response requirements, resulting from growth, organization change or newly defined requirements. It should be independent of location, i.e., capable of serving all J-M European locations requiring services without penalizing by cost or turnaround time a location situated remotely from the DP facility. In effect, the service must give every location equal access to DP in terms of cost and response.

Also, it should be flexible enough to respond to the diverse requirements of different locations, for example, interactive response vs. batch or scheduled, seven day, 24-hour service where required without cost penalizing those who don't need that high a response.

We also wanted to provide corporate headquarters, in a timely manner, with the data necessary to consolidate division performance with corporate data and the information needed to evaluate division performance.

Corporate departments, such as accounting, auditing, etc., as well as division management located in the U.S., needed to have access to management information equal to the access provided locally in Europe. Compatibility with corporate data wherever possible had to be ensured.

Two Information Needs

To do this we characterized demands for information into two categories: operating information and management information. We further characterized operating information as that information needed to conduct day-by-day business.

For the latter type, which was relatively constant rather than cyclical, we deployed minicomputers. For management data, which we defined as cyclical (monthly accounting closings, monthly operating reports) where demand for computer resources and people would fluctuate widely and where the recipients could be more than 5,000 miles apart, we opted for GE's

(Continued on Page S/16)

For Distributed Net

In-Depth Study Leads Insurer to Minis

By Esther Surden
CW Staff

HARTFORD, Conn. — Fireman's Fund Insurance Companies of San Francisco recently went through an in-depth selection process before it chose minicomputers for a distributed processing application, according to Mel Duraeo, vice-president of the Computer Services Department.

Speaking at a recent seminar here, Duraeo described everything from the firm's philosophy toward selection to the methods used to arrive at the final choice — Computer Automation's (CA) Syfa systems — in a distributed processing network.

The firm, which has three IBM 370/168s at a central site, also has 49 branch offices, 45 of which are now automated. The Computer Services Department has total responsibility for what equipment will be selected and when it will be installed. It interfaces with the Value Analysis Department, which is part of the controller's office, Duraeo explained.

"The user is kept completely out of the selection process and so are the applications people. In a lot of cases, the applications people end up having to design systems that fit our hardware. In a lot of cases, we are significantly ahead of the applications area," he said.

Duraeo pointed to cost as a very important but not the most important factor in selection of equipment. Fireman's Fund is more interested in maintenance capability, especially for "minicomputers that are going to be distributed to dispersed locations," he said.

Terminal Troubles

Originally each of the branch offices was supplied with GTE Information Systems Novar terminals, described as typewriter-like terminals with a cassette.

"We had significant problems with the vendor," Duraeo stated. "When the vendor became very interested in helping us they did not have the resources to help us. I actually sat in a meeting with design engineers, maintenance engineers and software people and within a space of two hours got seven different answers to one technical question on how something worked," he said.

When replacing the Novars the company did an exhaustive study including a thorough analysis of whether it should stay with the non-intelligent terminal or whether it should go to minicomputers. After it settled on minis, phase I and phase II requirements were defined.

For Phase I the firm required a system that would perform data entry and editing batch store and forward, as well as process over night, transmit the output store it on disk and print. Phase II included all the Phase I capabilities plus concurrent batch processing online to the host and local data base processing inquiry and update, he said.

"At that time we concluded that our users were not ready to use the Phase II facilitiies," Duraeo explained. Because the Novar equipment had been very labor intensive "we were willing to pay more for the computer hardware in order to reduce people cost." So for Phase I, which was to last an estimated 18 months, the company took a short contract with Four-Phase Systems, Inc. for a data entry system.

Although the company experienced some problems during the development cycle with the Four-Phase systems in general, it found "Four-Phase to be very good people. Maintenance has been great, uptime has been in the 99% plus range and management is extremely responsive," Duraeo said.

Although the firm hoped to stay with the same vendor for Phase II, it found it impossible because Four-Phase had operating system and hardware problems, Duraeo said.

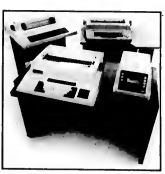
"They had built-in problems in their operating system in handling multiple applications and we spent a significant amount of time helping to correct those problems for the future," he added.

By the time Phase II was ready for implementation, "we were really quite delighted that what we were calling Phase II had already been given a name by the computer industry. It was 'distributed processing,' " Ben Bevis, assistant vice-president, said.

Phase II began in March 1976, about four months after the Four-Phase systems were installed. "The selection process culminated in November of

(Continued on Page S/18)

When we plant a terminal...



It gets as much TLC as Marilyn gives her potted Spathiphyllum.

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Comparative Data Can Be Misleading, Costly

By Jon David
Special to CW

The truth, the whole truth and nothing but the truth. The philosophy behind this oath required of witnesses should be applied in considering a minicomputer system.

The typical head of a smallish company, say a company in the $2 million to $20 million range, is normally a good businessman. However, today, many businessmen are still unqualified to make effective technical evaluations in the minicomputer area. They frequently choose unworkable or very poor systems because they cannot distinguish meaning from data.

The easiest area in which to compare computer systems is hardware. Computers have cycle times, disks have storage capacities, line printers have speeds and the like. The hardware descriptive parameters have some validity in comparing raw hardware; when buying a working system, however, the hardware statistics frequently have no meaning or, worse, are misleading.

A 15-million-character disk can hold one and a half times the data of a 10-million-character disk. What does this mean? If the system with the 10-million-character disk stores data with no waste, the 10-million-character disk will hold 10 million characters of data.

At the same time, the 15-million-character disk can be part of a system that stores data in, for example, 500-character blocks and blank fills incomplete blocks. Such a system would take 500 characters of disk to store 10 characters of data and would yield a data storage capacity of only 300,000 characters. While 15 is certainly more than 10, 300,000 is also noticeably less than 10 million.

Hardware statistics, even when true, can paint a very misleading picture.

Software Equally Confusing

The software area offers less hard data on which to make comparisons, but is equally prone to confusion and misinformation.

Let us assume two vendors offer software which sounds exactly the same with one exception: the first manufacturer also offers Isam. Obviously, the user is getting something more from the first manufacturer.

Isam is the mnemonic for indexed sequential access method. It is a method for storing and accessing data on disk. It is very useful in certain applications and even necessary in others. At the same time, however, it is quite often unnecessary.

Utilizing Isam has two side effects: the system automatically utilizes disk areas for index storage and program execution with Isam input/output is slowed down (relative to direct disk access programs). If you utilize Isam when you do not need it, you will both lose disk data storage capacity and slow down the response of your system. The Isam you got "free" can prove to be quite expensive.

Occasionally, a businessman will go beyond basic hardware and software comparisons. This is a good thing, because there are other very important areas. Unfortunately, here too, one can easily be misled.

I was recently speaking with a company that had a strong leaning to the equipment of one particular manufacturer. Since that equipment was not what I would have used, I asked the user why he so favored that particular system. He told me he felt maintenance was of prime importance and that a technical review had specifically stated that the manufacturer provided a national average response-to-complaint time of one hour.

My experience caused me to seriously doubt that statistic. Regardless of the validity of it, however, mean time to respond is not mean time to repair, and national averages do not reflect specific local performance. As a matter of fact, I happened to know a user in the same area who had systems from this particular manufacturer and had had equipment down for periods of three and two months the preceeding year.

The proliferation of comparative review documents and the plethora of computer

(Continued on Page S/25)

Buy The HP
Don't Get Caught
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The rock? That's your shiny, new HP 3000/II computer. Full of promise. Ready to do great things. Probably a very wise buying decision on your part.

And the hard place? Well, that's another place altogether. The place you're at when you discover that, all of a sudden or somewhere just down the road, you have large disc needs and a high ticket system that can offer only small disc solutions.

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Microcomputer Systems Introduces The MSC-1677. A Disc System With Big Capacity, High Reliability and Super Savings.

Our MSC-1677 is a high-power, low-cost hardware combination that delivers all the mass disc storage you require to keep your HP 3000 working and profitable. Part I of this attractive subsystem is our own super-sophisticated MSC-1000 disc controller, a product of advanced microprocessor-based technology—and a product field proven to be the most reliable and maintainable in the business.

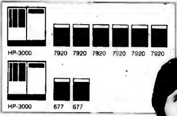
Part II is Memorex's impressive 677, a 200 megabyte disc drive that boasts a track record of over 15,000 successful installations. Together, these parts form a package that is totally hardware/software transparent under MPE—and totally superior to the disc package HP offers with the Series II.

Sometimes, Two Rocks Are Better Than One.

We know what you're thinking. Single-source systems, particularly Hewlett-Packard single-source systems, can make one feel very warm and cozy. But warm and cozy can turn uncomfortable and unprofitable in a hurry. Because it doesn't make a lot of sense to pay for the security if the system doesn't deliver the storage you need. Particularly when you can get both the security and the storage by working with us and our working partner, Memorex Corporation—like HP, a rock to be reckoned with.

Memorex, long known as the "memory/excellence" people in the IBM-compatible marketplace, has helped us make the HP 3000 a sensible, reliable, cost-effective alternative to IBM mainframes. Perhaps more than anyone else, Memorex has "written the book" on the successful installation of disc subsystem add-ons. They have, in large measure, shown the way in making "mixed vendor" systems preferable instead of just tolerable. They've done it with support—before, during and after the subsystem installation.

But most of all, Memorex has done it with the product.



Sometimes, Two Drives Are Better Than Six.

Particularly if they are Memorex 677 drives. This 200 megabyte, single spindle, disc storage drive is the product of three generations of Memorex disc experience. And it is the one product that has been installed more often than any other of its kind—count them, over 15,000 units at work for customers today.

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Your HP 3000 Will Never Know How Much You Are Saving.

Thanks to Microcomputer Systems MSC-1000 disc controller, which emulates the presence of the biggest drive

Results in 'Substantial Savings'

Independent's Language Speeds Programming

OAKLAND, Calif. — Granny Goose Foods, Inc. here, a snack food manufacturer, has converted from an IBM 370/135 to an NCR Century 151 small business system programmed in an independent vendor's programming language.

The conversion from the larger 370/135 was made to reduce all DP costs, John Barnhill, programming manager, noted. The 370 was transferred from Granny Goose to the company's parent firm — Del Monte Corp. — and replaced with the smaller system.

At that time there were still several incomplete programs that could not be run on the Century system, so the company bought time from an IBM user. This continued for some time, while the company contracted with some independent vendors to write the programs for the new system.

One of the vendors, Century Analysis, marketed a language called Pass/3 designed for the NCR Century system, Barnhill recalled. The use of the language sped up the writing of the remaining systems so much that Granny Goose opted to use it exclusively for its own operations as a means of reducing systems development costs, rather than using the NCR Century language, Neat/3.

The staff of two programmer/analysts attended a one-week Pass/3 class in October 1976 and since that time has used Pass/3 exclusively. About 60 programs have been written and put into production.

The conversion is complete, Barnhill stated, and the firm will soon begin additional development in areas that up to now had been considered projects for some point in the future.

"The time spent writing and debugging programs is greatly reduced, resulting in a substantial savings," Barnhill noted.

Using a multifunction language that can be used to write any type of program — captures, updates, reports and user-defined programs — from very limited input specifications helped speed operations. If desired, Neat/3 source listings can be produced as a by-product of the language, he noted.

Granny's Hardware

The hardware at Granny Goose includes a Century 151 with 64K of memory, two disk drives with 30M bytes each, two tape drives, a train printer and a card reader. It is used to run 10 different accounting systems in batch mode, he noted.

Two of the three systems that were important during Granny Goose's conversion were salesmen's accounting and plant reporting. The first was a relatively simple system, consisting of 18 programs designed to keep track of commissions and inventories on a weekly basis.

After attending programming classes at the independent vendor's school, Ellen Dudley, one of Granny Goose's programmer/analysts, began writing the programs in Pass/3. In approximately two months, all areas of the system were operational, written essentially by one person.

Fewer Cards

"Every line of coding I wrote in Pass/3 would have taken much more in Neat/3," Dudley explained. "There were fewer cards to keep, creating less chance for error."

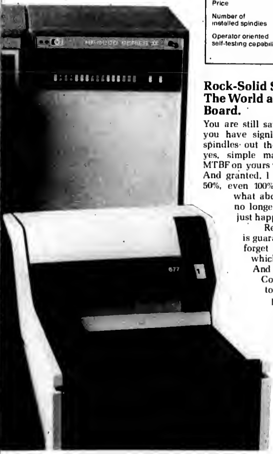
This savings can be seen in the fact that the system was written in 2,035 Pass/3 lines, which generated 12,064 lines of Neat/3.

Another system, written by Tony Flusch, is essentially a finished goods inventory, keeping track through ratios and theoretical concepts of all material and labor necessary to produce Granny Goose's existing product and providing statistical analysis for future products.

Flusch wrote all 35 programs inapproximately three months using Pass/3. His 1,541 lines of Pass/3 coding generated 16,244 lines of Neat/3.

3000 But... Between The Rock Hard Place.

HP can offer, the 50-megabyte 7920—without emulating either its capacity or its overall cost. To the Series II, our 677 will look exactly like three 7920's. This means usable capacity of 150 megabytes per spindle, with up to eight spindles (or 1200 megabytes) supportable by one of our MSC-1000 wonders. It also means that no customized, non-HP software is required to do the trick. You'll never have to worry about staying up to date with future HP software enhancements to the 3000.



Disc Subsystem Comparison Chart

Feeture	HP 7920	MSC-1677
Software Transperent under MPE/DS-3000	Yes	Yes
Microprogrammed Controller Architecture	Yes	Yes
Full ECC (error correction)	Yes	Yes
3330 Oisc Technology	Yes	Yes
Capacity per spindle (megabytes)	50	150
Reliability	Good	Much Better
Complete Maintenance Support	Yes	Yes
Price	Competitive	Super Competitive
Number of instelled spindles	Less Then 1000	Over 15,000
Operator oriented self-testing cepebility	No	Yes

Rock-Solid Support. Around The World and Across The Board.

You are still saying to yourself: "Sure, you have significantly more installed spindles out there than they do. And yes, simple math tells me that the MTBF on yours will be a third of theirs. And granted, I could save upwards of 50%, even 100% on drives alone. But what about once it is mine and no longer yours and something just happens to . . ."

Relax. Customer support is guaranteed. In spades. Don't forget one of the rocks nn which we have built this ad. And this product. Memorex Corporation is committed to support the MSC-1677 program with its vast service organization—a sophisticated interweave of skilled people, strong technical support and a logistics network bound together for a single purpose: immediote customer respnnse.

Beyond them, there is us. And our team of HP 3000 experts, backed by a fully functioning HP 3000/II System that can "acceptance test" subsystems, "systems test" spare parts, reproduce failures or anomolies so as to quickly analyze and troubleshoot problems at the system level.

Once again now, Memorex and Who?

Memorex and Microcomputer Systems Corporation. The people who forked out over three grand for this ad space because we think the MSC-1677 Disc Subsystem is something data processing decision-makers should know about. (We'd also like to sell a couple.)

In the coming months, you'll be hearing more from us. And not just in the HP 3000 peripheral add-on marketplace either. Dedicated to tha continued "conception through production" development, generation by generation, of micro-prngrammed controllers a year or two ahead of the industry, we are already hard at work in the 317 mb and 630 mh Winchester technology arena.

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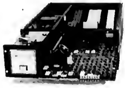

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microcomputer
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corporation

Networking Solves Firm's 'Saturation' Problem

(Continued from Page S/2)

ment work, local branch office functions, numerous system utilities and four synchronous multidrop 4,800 bit/sec communication lines.

The remote processors (Nova/2s and Nova/3s, each with a number of CRTs and serial line printers) handle communications, local terminal editing, printer spooling, screen format storage and TWX/Telex replacement for the branch offices. These remote stations may be "down-line" loaded at any time without disturbing normal network activities.

Disk storage consists of three 92M-byte drives, one for the on-line data base, one for software development and the third for backup and data base expansion. Two 9-track and two 7-track tape drives are used for transaction logging, development and Honeywell compatibility.

Infos is the software vehicle for accessing the 600,000 record data base, but the unique nature of the system is due to its homogenous network architecture, employing a protocol of Finning's own design, Harris said. All processing functions, be they system or user in origin, run as "processes." In which CPU the actual execution of a process occurs is defined by a process dictionary, which may be dynamically modified at any time to accommodate changes in software or hardware, he noted.

This lack of CPU dependence means additional processors may be added to he network to improve performance as the transaction load increases and new application systems are added. This is accomplished without software modifications, he indicated.

Similarly, processor failures have only a transitory effect on the system; response simply degrades until the fault is rectified or redistribution of processes is effected, Harris explained. This modular expansion feature means no significant processing limits have been built into the network design. Additional processing capabilities may be added at any time the application load requires it, he noted.

In order to simplify the task of developing and maintaining the network software, Finning implemented an enhanced version of BCPL, a structured system programming language. This compiler generates multitasking code for both Nova and Eclipse processors.

Application programs are currently written using Cfor, another Finning development. This preprocessor, which generates Fortran 5 code, was created to overcome the syntactic shortcomings of Fortran, encouraged structured programming and implement "field variables," a commercial data type. Another Finning software development was M-5, a virtual memory system that provides users with a 2-byte execution space with no special programming considerations, Harris said.

> *'Once the initial installation problems were ironed out, performance of the DG hardware has been excellent. Retaining an on-site field service engineer has played a major role in smoothing out the operation.'*

Performance Excellent

Once the initial installation problems were ironed out, performance of the DG hardware has been excellent, he said. Retaining an on-site DG field service engineer familiar with the system played a major role in smoothing out the operation.

DG's Infos, relatively new at the start, contained a number of bugs which only surfaced when the system went live and the software was thoroughly exercised. But with Finning's help, DG resolved the prolems and subsequent revisions have proved to be solid. Communications facilities provided by the B.C. Telephone Company are stabilizing favorably, Harris said.

The first and most cost-effective application to be implemented was the parts inventory system and it has been successfully on-line for six months. Personnel and account credit authorization followed shortly thereafter, with branch invoicing, TWX/Telex replacement and volume data entry scheduled for completion later this year.

Future Plans

Future plans include word-processing capabilities, a transparent link to another network designed for IBM 3270 terminals, shop floor data collection and fire-detection and access-control mechanisms for remote branch offices.

The network facility was foreseen by Finning as crucial to future operations, regardless of intital cost justification. But the economics already are favorable, Harris pointed out. Elimination of a four-day delay in customer invoicing, the return to Honeywell of now redundant equipment, replacement of the TWX/Telex facilities and the planned elimination of the off-line data entry system will "save" some $35,000 per month. Written off over the next five years, Finning's system will cost $27,000 per month, including maintenance and interest, so the initial net improvement measured in dollars alone is over $8,000 per month.

Langley is manager of computer software marketing for Finning Tractor and Equipment Co., Ltd.

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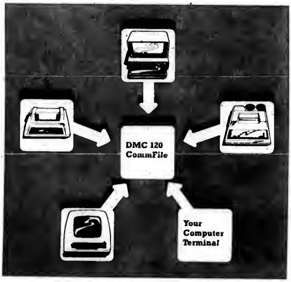

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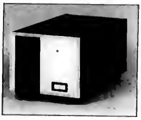

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Revenues Up 8%

Mini-370 Link Streamlines Hospital Lab Work

DES MOINES, Iowa — A Control Data Corp. laboratory minicomputer interfaced to an IBM mainframe at Mercy Hospital's DP center here has helped this institution increase its revenues 8% while reducing paperwork, an official said.

The "innovative" link between the hospital's IBM 370/135 at the DP center and the laboratory's CDC System 17 was developed because "unless the laboratory computer could communicate on-line with our business computer, we felt the investment wouldn't be a significant improvement to the overall procedure," Robert E. Williams, senior assistant administrator, said.

The hospital also wanted a system that could communicate with the 370, not over telephone lines, but over a cable connection, according to Kay Wright, director of information services. To suit the hospital's needs, William Noonan, systems analyst for Mercy's business computer operations, and Thomas Miller, analyst and hardware specialist from Medlab Co., the division of CDC that designed the system, built a prototype interface.

"A hard-wired board in the CDC computer allows the IBM 370/135 to talk to the CDC system as if we were a 3277 terminal talking to the IBM system," Wright explained. Since the installation of this interface, Medlab has built others for other customers, she noted.

Easily Expanded

The hospital decided it needed a laboratory system to cope with the paper-burdened functions in the laboratory. The lab needed a system that was "easy to use and easy to modify," Wright noted. The institution also wanted a stand-alone dedicated system that interfaced with existing instrumentation and one that could be expanded to take care of applications other than laboratory work.

The two systems sit about 1,000 feet apart on different floors of the hospital. Now all patient test data necessary for billing and management reports flows between the System 17 and the IBM mainframe. During the day patient admission, transfer and discharge information is transmitted to the CDC system. The mainframe processes this admitting information entered on terminals located in admitting and emergency room areas and relays it to the CDC computer.

"Once a day, after midnight, the CDC system sends all charge-in data over the same cable back to the IBM computer. This procedure takes about 15 minutes," Wright noted. "There has never been any problem with the system due to the cable or interface," she added.

The hospital believes in an integrated approach to data processing, so the laboratory, hospital officials and the DP department were all in on the design of the system.

"It is important to the success of any new procedure that the participants know 'why' they are performing a certain function," Wright said. "This accumulative understanding, or lack of it, can have a decided impact on the operation as a whole. Consequently, anyone who would have contact with laboratory test data was included in the training."

As personnel became familiar with the new procedures, it became apparent that the computer-based system was having a positive impact on the laboratory's work flow.

"Manual recordkeeping and the amount of paper 'floating' around the lab have been eliminated," Victor Pound, manager of the laboratory computer, noted.

"At both ends of the testing process we are experiencing smoother work flow and a quieter environment. Retrieving test records — once a frantic paper search — is now done by querying the display terminal in the laboratory," he said.

Use of the Medlab system begins well in advance of the actual recording of test results. First, the mini formats docotor's test orders that it reads from mark sensitive cards.

The printout is a "call for collection" or work sheet which lists patients' names, identification number, type of test and volume of specimen needed and the attending physician. This printout is delivered to the nursing units prior to 7 a.m. and is used by nursing personnel to verify which patients will have lab work during the next 24 hours,

A second printout made at the same time is on adhesive labels which technicians attach to the specimen bottles as they make the collection. Patients' names on the adhesive labels are automatically arranged by the computer acording to a convenient "route" through the hospital to save technicians time as they collect specimens.

Back in the laboratory, the technician verifies on the display terminal that the specimens have been collected and are available for test.

To expedite laboratory schedules, the system then produces a list of all similar tests. As each test is completed, the results are automatically relayed to the system and put into the proper patient record there. The technician uses

(Continued on Page S/22)

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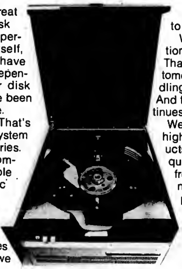

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Users Urged to Take Mini Selection Seriously

(Continued from Page S/2)

marize the technical content of the proposal in a standard manner that facilitates direct comparisons among vendors.

Specific Factors

The critical factor for judging a business minicomputer's useful speed is the speed at which the input and output devices operate. Extending the system is another major consideration in the evaluation process. Thus, one should consider a machine which accurately approximates current requirements, but which can easily be expanded to meet future demands.

A critically important area of evaluation is software. Vendor's claims and promises concerning the availability and capability of software should be carefully checked, particularly for software that has been announced but not yet released. Vendors frequently fail to live up to their marketing publicity or timetables for delivery.

The availability of reliable and qualified equipment maintenance is also critical in the business minicomputer environment.

Other factors include:

- Availability and cost of support for conversion assistance and training of company management.
- The location and availability of backup equipment, machine time provided for program testing prior to installation of your computer system and the extent of software documentation (particularly operator instructions).
- The trade-offs involved in the lease/rental/purchase contract offerings.

Other costs must also be considered. For example, one or more new employees might be needed to run the system and supplies, office space and overhead costs must also be included.

Added to these recurring annual costs should be the one-time costs of any initial conversion, any vendor support separately charged for and any delivery costs, taxes, etc. In some cases, these one-time costs can exceed 50% of the first year's cost of running the business minicomputer system.

The act of finally selecting the vendor and equipment configuration actually consists in most cases of a careful review and synthesis of the results of each major phase in the evaluation procedure. In most cases, a clear pattern of superiority will emerge.

Conversion, Installation Team

Once the equipment selection is made, the time has come to begin planning and scheduling the conversion of the current systems. The underlying requirement is to affix clear responsibilities, authorities and controls.

An excellent approach toward doing this is to form a conversion and installation team composed of some or all of the following people: company management, designated operator, DP manager, supervisory personnel from departments to be affected by the computer, computer vendor's representative and/or independent consultant.

Before any computer system is installed, familiarize all concerned parties — usually the entire company — with the features and capabilities of the new equipment.

As part of the computer installation, there will be a need for file conversion that will usually be performed by manually keying information from clerical records directly onto magnetic ledger cards, tape cassettes, punched cards or other storage media.

The importance of carefully performing file conversions cannot be overstated. If the file conversions are performed completely and accurately prior to installation of the computer system, the probability of a relatively trouble-free cutover to the new system will be greatly increased.

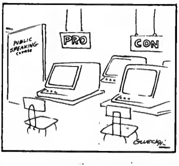
The Cutover

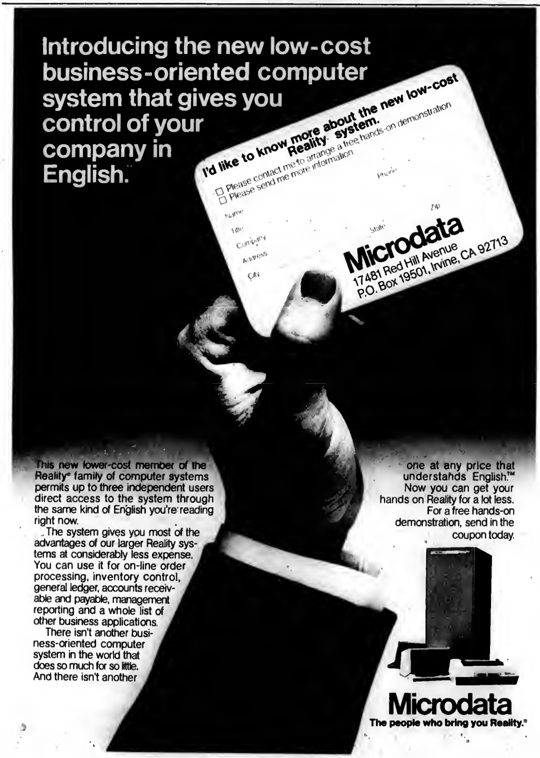
Now, that the computer equipment and related hardware have been delivered and installed, it is time to begin the crucial work of cutting over. This cutover period may be not only the most critical, but also the most error-prone, frustrating and costly. For it is during the cutover that all hidden problems are forced out into the open.

Perhaps the most important guidelines in the cutover operation is this: cut over only one system function at a time. The smaller the function, the better.

A cutover technique commonly used when installing a business computer system is that of parallel operations. An alternative to parallel processing is to pick a cut-off data for each application and "go live" on the new system after that date. The programs in question must be thoroughly tested with simulated information and the only thing in question is the validity of the converted files.

Hyatt is managing editor, Datapro EDP Solutions, *Datapro Research Corp. Delran, N.J. This article is based on a report from Datapro.*

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Mini Helps Auto Parts Firm Hike Sales 400%

PLYMOUTH, Mich. — A small business system has enabled National Set Screw Corp. (NSS) here to increase its sales almost 400% in four years without adding administrative help, according to Peter Ewing, president.

Programmed by the president himself, the system performs accounting, inventory, management, order entry and job cost estimation functions. Employees in various locations can simultaneously access programs and data stored in a central system through remote workstations.

In a key application the system also figures how much money it costs per day to use a particular machine for a particular job to allow the company to find out what jobs are profitable.

In 1973 the firm, which supplies parts for the auto and construction industries, reported sales of $1.5 million. Sales rose from that figure to an excess of $6 million in the most recent fiscal year.

"We achieved this increase in our sales without adding any more administrative staff," Ewing noted. "The Datapoint 2200 system we installed in 1974, plus the additions we have made to the unit in the meantime, have enabled us to raise the productivity of existing personnel to handle the increased workload," he said.

"Our out-of-pocket savings have been tremendous," he added. "Additional people would have cost us substantially more than the Datapoint investment but would not have produced the same results. As we see it, the equipment is not just a money saver, it's a moneymaker."

Comprehensive Study

NSS began its internal computing operation with a single Datapoint 2200 system in September 1974. Before settling on the Datapoint 2200 processor, Ewing made a comprehensive study of all the small business computers available at that time.

Ewing looked at small business systems and bare-bones minis alike, including systems from Digital Equipment Corp., Burroughs Corp., Basic Four Corp., Varian Data Systems and IBM. Systems from both Microdata and Datapoint came closest to fulfilling the need; the Datapoint was chosen on price and software considerations. As Ewing pointed out, "IBM has nothing comparable to it for under $300,000."

He said no other maker offered the comprehensive operating system and sophisticated programming languages available on the 2200. "I was especially impressed by the Databus language, with which I have written almost all of the programs involved here."

Key Benefit

Another key benefit of the system, from Ewing's point of view, is economy of operation. "I absolutely did not want to add a DP manager to our staff. With the aid of the 2200, a couple of sharp secretaries and I have been able to handle the entire operation," he said.

The original 2200 installation has now been upgraded to allow several users to access the processor at one time. The Datashare system incorporates not only the 2200, but two cartridge disk drives for data and program storage, a printer and five Datapoint 3600 CRT workstations. The workstations are located in various offices at NSS.

Ewing plans to increase the capability of the system again by putting in a large Datapoint 5500 processor to allow more terminals to be attached and to gain quicker response time, he said. The firm also purchased a Tektronix, Inc. 4501 graphics terminal to help its engineers, emphasizing its commitment to user-oriented DP.

Order Starts Ball Rolling

The basis for NSS' in-house activity is the purchase order, which usually arrives in the mail. The company currently receives approximately 1,000 purchases a month, all of which are entered into the system through a single unit in the company's administrative offices.

"My secretary can handle the purchase orders in a few hours each morning," Ewing stated. "Under our previous system, this amounted to a

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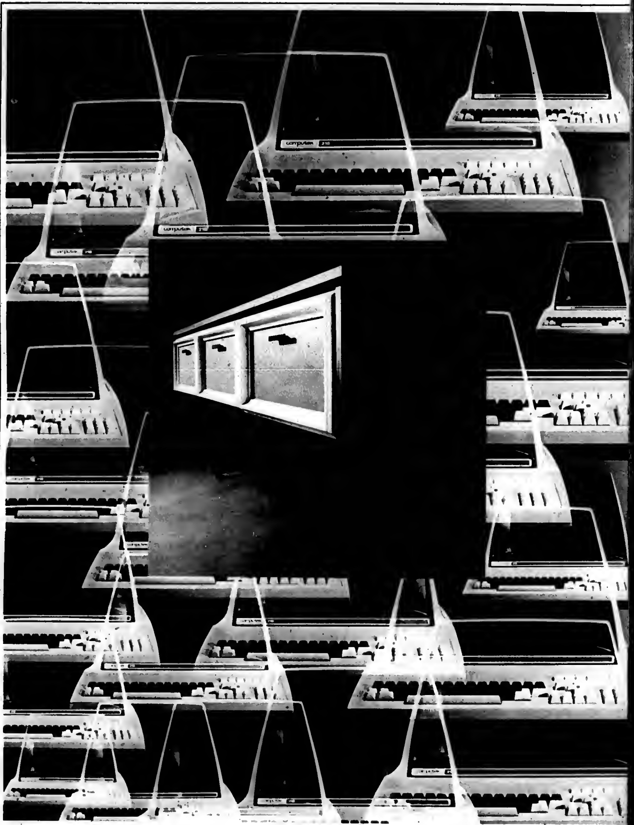

'Powerhouse' in Small Package

Micros Helping OCR, Minis Perform Together

By Dennis Sullivan
Special to CW

In the past, the high cost of optical character recognition (OCR) has alienated that input method from the world of the minicomputer.

However, with the advent of the microprocessor, OCR has significantly dropped in price, just as the minicomputer cut costs through the use of semiconductor memory and LSI circuitry.

The end result is OCR and minis are combining their capabilities to achieve a powerhouse of performance in a small package. This provides the end user with what he is always looking for — more performance at less cost.

As the cost of hardware decreases and becomes affordable to more people, the volume of data to be processed becomes more abundant. As this data volume increases, more emphasis is being placed on distributed DP.

The large centralized computers are being replaced by the minicomputer at various DP sites. As the minicomputer begins to perform this role, OCR is waiting to demonstrate what it can do.

A minicomputer can be purchased for about $20,000, the same price range as the newer low-cost OCR systems.

The largest potential market for the minicomputer is conventional business DP. Ironically, OCR's biggest potential market is also business DP in the areas of remittance processing or turnaround documents used in utilities, municipalities, insurance companies and publishing concerns. Other applications include banking applications such as credit card applications, reject reentry, check processing, loan payment processing and proxy scanning.

Once the minicomputer has been purchased, a significant number of CRT terminals can be added depending on the number and complexity of other functions the minicomputer will be performing. But rather than add those additional data entry terminals at a cost of about $1,000 per terminal and an overhead of 20 operators per month — which costs an additional $16,000 per month (based on $5 per hour) — and achieving a 10,000 to 11,000 keystroke rate per hour, per operator, an OCR installation costing $20,000 can reduce the labor costs while increasing the data capture rate.

'Data entry costs must come down, and they can with a mini and OCR combination.'

The user can achieve a 100,000 keystroke production level per operator and perform the work of several operators at a single workstation.

OCR Neglected

At most user sites the cost of data entry is still eating up the majority of DP costs. This is mainly because most DP managers have either neglected to give OCR an honest evaluation or have been given the wrong information on how OCR can fit into their present method of data entry. Data entry costs must come down, and they can with a mini and OCR combination.

Even if the entire document cannot be recognized by OCR (document with a preprinted account number and a location where someone will hand-print the amount), OCR is still feasible by just entering the account number automatically and allowing an operator to manually enter the amount.

This method can be referred to as the "read and key" method, and aside from just reducing the manual key entry requirements, it provides a better method of handling documents. By eliminating the necessity of the operator physically handling each individual document, users can gain greater efficiency.

Sullivan is communications director at Key Tronic Corp., Spokane, Wash.

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32-Bit Systems May Dominate Future Mart

(Continued from Page S/2)

with getting a job done.

In similar fashion, most users never confront the PDP-11's 16-bit word, nor that of Data General's Nova or Eclipse. These systems have built up so much software support for the 16-bit word, it is of no concern except for special applications.

On the other hand, companies such as Interdata and Systems Engineering Laboratories, which have largely made their mark with 32-bit word minicomputers, have an easier time developing the system software. The 32-bit word should ultimately lead to more elegant software. Also, the longer word length with its large address space makes it possible to run large application programs without segmenting.

Because software development is easier on a longer word length machine, and software is the limiting factor now (and in the foreseeable future) for minicompter use, it seems unlikely that a new minicomputer company would develop a mini with less than a 32-bit word. This assumes all other things being equal which they never are.

Semiconductor Look-Alikes

The semiconductor manufacturers, like the minicomputer pioneers, are hardware buffs. Safaris into the wilds of software development are scary, thus they ogle any system with piles of already developed software. They also require high volume to turn a profit. So minicomputers with a large installed base and hefty software support are prime candidates for a semiconductor manufacturer's look-alike model.

This appears to point to the conclusion that the safest course for a minicomputer manufacturer is to develop little software and to maintain a small user base. That is obviously uncapitalistic and the road to failure.

What it does indicate, however, is that viable minicomputer systems cannot be produced with cookie cutters. If they are, the semiconductor houses will build a look-alike that will outsell the original because it will be cheaper. The software and hardware must be optimized for specific applications so that high-volume, general-purpose, less expensive look-alikes can't be developed to do the job.

The 32-bit word minicomputer has the inherent capacity to be applicable for a wide range of jobs because of high precision, rich instruction set, large address space and big memory. But which jobs should its hardware and software modules be optimized for? That is the manufacturer's challenge.

It seems unlikely that the 32-bit minicomputers can offer a challenge in the older 16-bit minicomputer markets: real-time industrial control, test and measurement, small time-sharing and desk calculator applications and data communications (line handling). The 16-bit word minicomputer hardware and software have been optimized for these markets. In some cases, where a 16-bit minicomputer is overqualified for the job (has more hardware and software than the job requires), the challenge will come from the microcomputer.

It is in the expanded minicomputer markets that require new software, more powerful hardware or a reorientation of the hardware/software system where the 32-bit word minicomputers shine. These are applications for larger scientific processing systems, data communications processors (front-ends, remote concentrators) and network processors in distributed processing systems.

Of course, the big market for expansion eyed by all minicomputer manufacturers is the commercial market. It is the commercial market that requires a major hardware/software reorientation. Because of this, the commercial market is risky even though it is the most potentially lucrative market available.

The new software will be easier to program on a 32-bit mini. The systems can be expanded into very powerful configurations. The software/hardware reorientation for the commercial market, however, is probably little easier for 32-bit minicomputers than for 16-bit minicomputers.

Think Commercial

The reason is the hardware/software orientation results from the thinking of the people who plan, design, build, sell and service minicomputer systems. All these people must be reeducated to think commercial. Until that is done, precious little reorientation that is relevant to the commercial market will happen. The developer is not commercially oriented because the traditional minicomputer markets are very different from the commercial market.

Up to now, the minicomputer manufacturers have primarily responded, in interrupt mode, to the OEM market. Initially they responded to the product OEM who developed an end-user product: buying CPUs and memory from one manufacturer, peripherals from other manufacturers and tying them together with special interfaces and software. The minicomputer manufacturer was primarily concerned with making modular, high performing, low-cost CPUs and memories.

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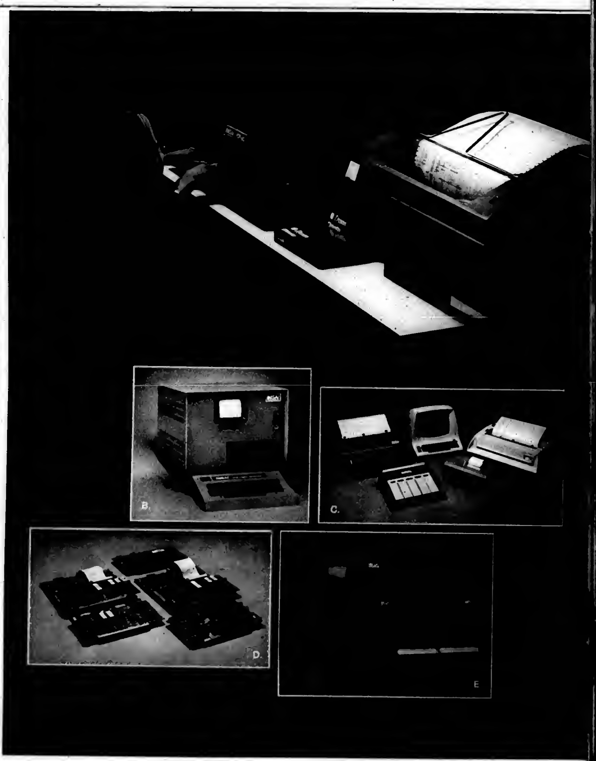

Sophisticated Capabilities

Large Mini Realistic Alternative to Mainframe

By Neal J. Rapp
Special to CW

Nearly everyone knows that minicomputers are getting smaller and cheaper. But not too many people realize they are also getting larger and cheaper. I'm referring to the growing use of the large-scale minicomputer that is, systems that provide large-scale mainframe functions in a minicomputer package.

Large-scale minicomputers are more like mainframes than minis. They are used to solve very sophisticated problems by system designers who use techniques and functions that until recently were available only on very large systems. That means the market for large-scale minicomputer systems is not a traditional minicomputer market. And that, in turn, implies that a large-scale minicomputer is much different than a traditional minicomputer.

In fact, the only reason they are called minicomputers at all is because their central processors are derived from the 16-bit architecture that has become synonomous with minicomputers.

People who use large-scale minicomputers view them as extremely cost-effective solutions to on-line, interactive problems. Their most exciting characteristic is that they combine large system software with the interactive capabilities of the traditional minicomputer, at costs far below mainframe costs.

Therefore, to get a fair indication of what large-scale minicomputers can do, and for whom they do it, they should be compared with mainframes and the mainframe environment, rather than with traditional minicomputers.

Just how do they compare to mainframes? The simplest answer is that they compare differently in different areas.

For example, there is little difference in the area of system capability. Because it has comprehensive, sophisticated software, a large-scale minicomputer system can do most things a large mainframe can do. A good large-scale minicomputer system and a mainframe have these things in common:

- A sophisticated data base management system.
- Large virtual memory addressing capabilities.
- A large main memory capacity.
- A wide array of languages and software utilities that can be mixed without restriction.
- The ability to run very large programs.
- The ability to handle a large number of users.

When it comes to performance, the differences between large-scale minicomputers and mainframes become a matter of interpretation.

If performance is measured in interactive, on-line terms — response time, for example — the large-scale minicomputer and mainframe are very close, with the advantage usually going to the minicomputer. But when performance is measured in batch-oriented terms, the mainframe, which was designed for batch work, ordinarily comes out on top.

There is a significant physical difference between large-scale minicomputers and mainframes. Obviously, the minicomputer-based system is considerably smaller. While size alone may not be an important criterion, the mainframe's size often means a user must provide expensive environmental controls that are not always necessary with a large-scale minicomputer.

Finally, there's the difference in cost. Because their orientation has primarily been toward interactive, on-line work, large-scale minicomputers offer significantly more interactive work per dollar compared with mainframes. On a system level, it's safe to say that a large-scale minicomputer system costs about one-tenth to one-half the price of a mainframe with comparable capabilities.

Since system designers have the same tools available on mainframes and large-scale minicomputers — comprehensive software capabilities, large virtual memory address space and large amounts of storage — it follows that mainframes and large-scale minicomputers can be used for similar applications.

Specifically then, who uses large-scale minicomputers and how are they used?

One class of user is the one with a number of remote sites, each using most of the data it generates. The large-scale minicomputer's data base management capability supports local operations, and its efficient data communication capability allows data to be transmitted to a host system.

For example, a West Coast aerospace/electronics company uses a large-scale mini system in the headquarter's financial department. The system lets the vice-president of finance gather data from a division's operating groups and use the data to prepare monthly financial reports. Specific information can be transmitted to a corporate host system, an IBM 370/158, to update its files.

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(Continued on Page S/16)

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Single Board Central Processors:
• MPU-A (8080 based)—Industry standard.
• MPU-B (8085 based)—50% faster 8080.
• 8048—Programmable control computer.
Interfaces:
• Video I/O—24x80 CRT. Edit & data entry.
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• DMA—For floppies & line printers.
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• Printers—44/80/132 col. 30 cps-300 lpm.
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Self-Contained Systems:
• VDP-80—Computer/terminal/mass storage unit. Assembled & tested.
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Software:
• DOS—Enhanced CP/M.
• BASIC—Interactive or compiler with scientific and/or commercial features.
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SCS 1 & 2/TCOS—Assembler/line editor/debugger.
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Compare IMSAI. You'll realize that ours is the most complete product line available. Whatever your needs, you can get them from one source. IMSAI.

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Announcing IMSAI's VDP-80. This totally self-contained unit includes a megabyte of disk memory via floppy disk, 32K computer memory (expandable to 256K), 12" CRT and 62 pad main keyboard with 10 pad numeric keyboard. Several printer options available.

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Answers For The Personal User & Educators:

Introducing IMSAI's new PCS-80 System, the fully integrated microcomputer component system, configurable to your exact needs. The basic system consists of our Intelligent Keyboard and the PCS-80 which houses an 8085 based CPU, 16K of RAM, intelligent ROM monitor, serial I/O port, 24x80 CRT, with an extra 7 slots in the chassis for expansion.

System component options include single or dual mini and standard floppy disks. The choice is yours, configure the system as you like.

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Rather do it from scratch? Start with our single board MPU-B central processor, the heart of the PCS-80 System. It has a 1K ROM monitor, 256 bytes of RAM and serial and parallel I/O.

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We offer rack mountable components for the standard 19" RETMA racks, powerful MPU boards, I/O and memory boards for easy system expansion and configuration, and a broad line of peripherals and subsystems fully integrated and ready to go to work.

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There are over 10,000 of you. And, we haven't forgotten. You might say that we thought of you before you even thought of us.

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Just ask IMSAI.

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Features and specifications subject to change without notice.

Auto Parts Company's Mini Helps Boost Sales

(Continued from Page S/10)

full-time job for at least one clerk and other less qualified help."

Ewing's secretary uses a 3600 workstation to enter purchase order information into a computerized filing system. The video screen displays a menu, or an entry format for the data, which helps secure error-free data input. Should errors be made during the data input process, the unit is programmed to signal the operator and initiate reentry of the data.

Inventory Check

Finished goods inventories are checked by the mini and a stock-pull issued. If the item is not in stock, the order is entered into the NSS production schedule and a request for raw material is inserted.

NSS executives receive a daily printout of jobs in progress and their current status. Managers need a daily printout of this file so that they can determine the status of any particular job and, at the same time, get an accurate overview of company progress in sales and deliveries.

The order entry log, also prepared at periodic intervals, provides company executives with current information on orders in process. This enables them to handle production scheduling more efficiently and to maintain and replenish necessary stocks of raw materials and other parts.

Order File

The file of order entries also provides information for sales and analyses, including the movement of particular products, the performance of sales representatives and territorial and industry performance. When goods are shipped; the same file is used as the basis for preparation of the appropriate invoices

The order entry information provides a basis for the production scheduling process, which is under the direction of Paul Ewing, Peter's brother and partner in this family-owned business To increase our productivity, we must accurately assess — on the basis of manpower requirements, machine availability and, especially, stocks of raw materials and other commodities — what the manufacturing situation will be two, three or four months from now," he explained

"If you guess wrong here, other variables such as raw stock prices, which can fluctuate rapidly, will eat you right up."

NSS has completely converted its stock inventory to the Datapoint system and is currently converting its work-in-progress to the computerized approach. The company Ewing pointed out, will reap major benefits from having all its materials inventory maintained and updated by the system. We will be better able to adjust our production scheduling and sales forecasting to the buying process We will then have the stock when we need it and won't be so vulnerable to price fluctuations and materials shortages This will also help us to make sure that we do not have capital tied up in dormant inventory."

Self-Taught Programs

Peter Ewing learned the Databus language in a few hour's time through study of the manual provided by Datapoint. "I did take some computer programming in courses," he acknowledged, but that was some time ago.

Ewing noted that while the Datashare system has helped the company in many ways, it has been especially helpful in the area of job follow-ups "We used to keep a card file on each job we had going, and as the number of jobs we handled increased, it got to be a three-ring circus trying to keep tabs on everything," he said.

"When customers called and asked about the status of their orders or why an order hadn't been delivered on time, I used to spend half my day tracking down the jobs and finding out what the trouble was. Quite often my efforts were hampered by misfiled or lost job cards; that can't happen now With the minicomputer, all that information is stored on a consolidated file which can be accessed immediately It has enabled me to make much more productive use of my time," he indicated.

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erhouse' in Small Package

cros Helping OCR, Minis Perform Together

ennis Sullivan
ecial to CW

it, the high cost of ıracter recognition alienated that in- from the world of nputer.

with the advent of ocessor, OCR has v dropped in price, minicomputer cut ugh the use of semiconductor memory and LSI circuitry.

The end result is OCR and minis are combining their capabilities to achieve a powerhouse of performance in a small package. This provides the end user with what he is always looking for — more performance at less cost.

As the cost of hardware decreases and becomes affordable to more people, the volume of data to be processed becomes more abundant. As this data volume increases, more emphasis is being placed on distributed DP.

The large centralized computers are being replaced by the minicomputer at various DP sites. As the minicomputer begins to perform this role, OCR is waiting to demonstrate what it can do.

A minicomputer can be purchased for about $20,000, the same price range as the newer low-cost OCR systems.

The largest potential market for the minicomputer is conventional business DP. Ironically, OCR's biggest potential market is also business DP in the areas of remittance processing or turnaround documents used in utilities, municipalities, insurance companies and publishing concerns. Other applications include banking applications such as credit card applications, reject reentry, check processing, loan payment processing and proxy scanning.

Once the minicomputer has been purchased, a significant number of CRT terminals can be added depending on the number and complexity of other functions the minicomputer will be performing. But rather than add those additional data entry terminals at a cost of about $1,000 per terminal and an overhead of 20 operators per month — which costs an additional $16,000 per month (based on $5 per hour) — and achieving a 10,000 to 11,000 keystroke rate per hour, per operator, an OCR installation costing $20,000 can reduce the labor costs while increasing the data capture rate.

'Data entry costs must come down, and they can with a mini and OCR combination.'

The user can achieve a 100,000 keystroke production level per operator and perform the work of several operators at a single workstation.

OCR Neglected

At most user sites the cost of data entry is still eating up the majority of DP costs. This is mainly because most DP managers have either neglected to give OCR an honest evaluation or have been given the wrong information on how OCR can fit into their present method of data entry. Data entry costs must come down, and they can with a mini and OCR combination.

Even if the entire document cannot be recognized by OCR (document with a preprinted account number and a location where someone will handprint the amount), OCR is still feasible by just entering the account number automatically and allowing an operator to manually enter the amount.

This method can be referred to as the "read and key" method, and aside from just reducing the manual key entry requirements, it provides a better method of handling documents. By eliminating the necessity of the operator physically handling each individual document, users can gain greater efficiency.

Sullivan is communications director at Key Tronic Corp., Spokane, Wash.

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*(Published quote of an independent computer expert. Name on request.)

32-Bit Systems May Dominate Future Mart

(Continued from Page S/2)

with getting a job done.

In similar fashion, most users never confront the PDP-11's 16-bit word, nor that of Data General's Nova or Eclipse. These systems have built up so much software support for the 16-bit word, it is of no concern except for special applications.

On the other hand, companies such as Interdata and Systems Engineering Laboratories, which have largely made their mark with 32-bit word minicomputers, have an easier time developing the system software. The 32-bit word should ultimately lead to more elegant software. Also, the longer word length with its large address space makes it possible to run large application programs without segmenting.

Because software development is easier on a longer word length machine, and software is the limiting factor now (and in the foreseeable future) for minicompter use, it seems unlikely that a new minicomputer company would develop a mini with less than a 32-bit word. This assumes all other things being equal which they never are.

Semiconductor Look-Alikes

The semiconductor manufacturers, like the minicomputer pioneers, are hardware buffs. Safaris into the wilds of software development are scary, thus they ogle any system with piles of already developed software. They also require high volume to turn a profit. So minicomputers with a large installed base and hefty software support are prime candidates for a semiconductor manufacturer's look-alike model.

This appears to point to the conclusion that the safest course for a minicomputer manufacturer is to develop little software and to maintain a small user base. That is obviously uncapitalistic and the road to failure.

What it does indicate, however, is that viable minicomputer systems cannot be produced with cookie cutters. If they are, the semiconductor houses will build a look-alike that will outsell the original because it will be cheaper. The software and hardware must be optimized for specific applications so that high-volume, general-purpose, less expensive look-alikes can't be developed to do the job.

The 32-bit word minicomputer has the inherent capacity to be applicable for a wide range of jobs because of high precision, rich instruction set, large address space and big memory. But which jobs should its hardware and software modules be optimized for? That is the manufacturer's challenge.

It seems unlikely that the 32-bit minicomputers can offer a challenge in the older 16-bit minicomputer markets: real-time industrial control, test and measurement, small time-sharing and desk calculator applications and data communications (line handling). The 16-bit word minicomputer hardware and software have been optimized for these markets. In some cases, where a 16-bit minicomputer is overqualified for the job (has more hardware and software than the job requires), the challenge will come from the microcomputer.

It is in the expanded minicomputer markets that require new software, more powerful hardware or a reorientation of the hardware/software system where the 32-bit word minicomputers shine. These are applications for larger scientific processing systems, data communications processors (front-ends, remote concentrators) and network processors in distributed processing systems.

Of course, the big market for expansion eyed by all minicomputer manufacturers is the commercial market. It is the commercial market that requires a major hardware/software reorientation. Because of this, the commercial market is risky even though it is the most potentially lucrative market available.

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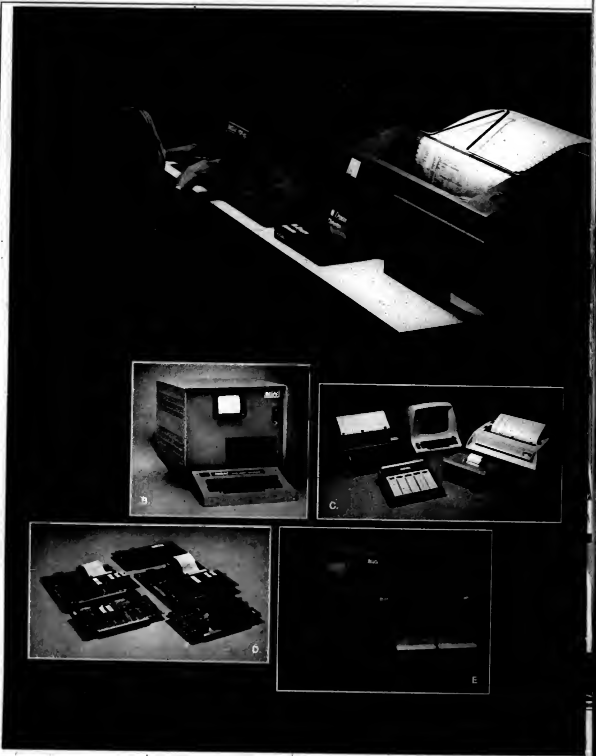

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  - SCS 1 & 2/TCOS—Assembler/line editor/debugger.
  - 4 & 8K BASIC—Optional cassette support.

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Auto Parts Company's Mini Helps Boost Sales

(Continued from Page S/10)

full-time job for at least one clerk and other less qualified help."

Ewing's secretary uses a 3600 workstation to enter purchase order information into a computerized filing system. The video screen displays a menu, or an entry format for the data, which helps secure error-free data input. Should errors be made during the data input process, the unit is programmed to signal the operator and initiate reentry of the data.

Inventory Check

Finished goods inventories are checked by the mini and a stock-pull issued. If the item is not in stock, the order is entered into the NSS production schedule and a request for raw material is inserted.

NSS executives receive a daily printout of jobs in progress and their current status. Managers need a daily printout of this file so that they can determine the status of any particular job and, at the same time, get an accurate overview of company progress in sales and deliveries.

The order entry log, also prepared at periodic intervals, provides company executives with current information on orders in process. This enables them to handle production scheduling more efficiently and to maintain and replenish necessary stocks of raw materials and other parts.

Order File

The file of order entries also provides information for sales and analyses, including the movement of particular products, the performance of sales representatives and territorial and industry performance. When goods are shipped; the same file is used as the basis for preparation of the appropriate invoices.

The order entry information provides a basis for the production scheduling process, which is under the direction of Paul Ewing, Peter's brother and partner in this family-owned business. "To increase our productivity, we must accurately assess — on the basis of manpower requirements, machine availability and, especially, stocks of raw materials and other commodities — what the manufacturing situation will be two, three or four months from now," he explained.

"If you guess wrong here, other variables such as raw stock prices, which can fluctuate rapidly, will eat you right up."

NSS has completely converted its stock inventory to the Datapoint system and is currently converting its work-in-progress to the computerized approach. "The company," Ewing pointed out, "will reap major benefits from having all its materials inventory maintained and updated by the system. We will be better able to adjust our production scheduling and sales forecasting to the buying process. We will then have the stock when we need it and won't be so vulnerable to price fluctuations and materials shortages. This will also help us to make sure that we do not have capital tied up in dormant inventory."

Self-Taught Programs

Peter Ewing learned the Databus language in a few hour's time through study of the manual provided by Datapoint. "I did take some computer programming in courses," he acknowledged, "but that was some time ago."

Ewing noted that while the Datashare system has helped the company in many ways, it has been especially helpful in the area of job follow-ups. "We used to keep a card file on each job we had going, and as the number of jobs we handled increased, it got to be a three-ring circus trying to keep tabs on everything," he said.

"When customers called and asked about the status of their orders or why an order hadn't been delivered on time, I used to spend half my day tracking down the jobs and finding out what the trouble was. Quite often my efforts were hampered by misfiled or lost job cards; that can't happen now. With the minicomputer, all that information is stored on a consolidated file which can be accessed immediately. It has enabled me to make much more productive use of my time," he indicated.

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Tracks Order Progress

Photo Studio's Mini Puts Production In Focus

CHATTANOOGA, Tenn. — To say that Olan Mills School Portrait Division is using a minicomputer to solve a production problem doesn't really focus in on the extent of that problem.

Each year the firm photographs and processes portraits for over 1 million elementary, high school and college students from several hundred schools located in thirteen Southeastern states.

Making sure that Joan Doe's picture gets to Joan Doe can be a monumental task, according to Olan Mills II, chairman of the board.

The minicomputer is part of a larger system designed by Technical Analysis Corp. (TAC) of Atlanta. The entire system is a combination of a Data General Corp. Eclipse minicomputer and several Micronova systems. The Micronovas are replacing Monroe calculators previously used in the production process, according to Fred Friday, production control manager.

When an order is received its requirements are input to the system via one of six interactive display terminals. The system then monitors the movement of the order through the complete photographic and packaging process.

The minicomputer tracks the location of each order in process, schedules work loads and alerts staff members to potential production problems before they become serious.

Should delays occur, it informs staff personnel so that the delayed order can be located and placed in a top priority production flow, Mills said.

In addition to order tracking, production scheduling and accounting, the system is used for software development and to load compiled programs into microcomputers that control the color printing machines used for printing the photographs.

Long-term color information is stored and analyzed periodically to fine tune the total system. Technicians also monitor the photographic processes on a daily basis, making any necessary changes to insure color quality, he added.

The configuration consists of the CPU, a 92M-byte disk system, dual 9-track magnetic tape transports, six interactive CRTs, two hand-held OCR readers, two medium-speed printers and a line printer. The system runs under Business Basic software, supplied by TAC.

Ended Manual Functions

Prior to purchasing the large-scale mini, the firm used a Data General Nova 2 to develop software and load compiled programs into the microcomputers. Accounting functions at that time were performed manually and no computerized tracking system existed. The Nova 2 is now located at another facility where it is used for photographic and electronic research, Mills said.

When switching from the Nova 2 to the Eclipse the company did not consider any other manufacturer's system, Friday said, because the Nova 2 was running the TAC Basic and "it would have been a massive effort to change over." Besides, the company was satisfied with the system, he indicated.

"The main considerations for purchasing the Eclipse," Mills said "were speed, expandability and, of course, cost benefits. We needed a machine powerful enough to handle the eight ports that we required at that time and would be expandable to accommodate future growth."

He said the company included the 3330-type 92M-byte disk subsytsem to allow the high-speed system to be easily expanded with up to three additional 92M-byte disk drives. The cost benefits resulted from decreased production costs. "The improvement in service further justified our computer investments," he added.

"The Business Basic language that we have been using since we installed the Data General system offers many features that we find particularly useful. One of the most significant is the multiterminal/multiprogramming capability inherent to most Basic systems," he noted.

"To us, however, the most attractive feature of the language is the indexed sequential access method. It allows rapid inquiry from a reasonably large, randomly organized data base. Furthermore, its file positioning feature permits any byte within a file to be accessed without the need to define a specified record length. This allows variable-length records to be located within a single file, Mills stated.

According to Friday, "many of the RDOS utility features incorporated within Business Basic are also useful to us, since they allow system maintenance concurrent with operation under Basic. One of the most significant utilities is a comprehensive file maintenance system which allows inspection and/or updating of many of the RDOS-type files within our system."

System Saves Farm $650/Month

By Cliff Burke
Special to CW

VINCENT, Iowa — Trying to communicate ideas and solutions through systems people and programmers to a computer was a difficult but necessary task until my firm, New Cooperative, Inc. here, got its portable small business system.

When IBM came out with the 5100 portable system about a year and a half ago, I was convinced this was my opportunity to learn the Basic language and write programs to get the results I wanted.

New Cooperative is a farm cooperative located in a small town here. The business is larger than an average sized company and sales this year will be about $36 million.

Cooperatives face a unique accounting problem. All transactions of the member/owners have to be maintained so that dividends can be distributed based on their patronage.

After receiving the 5100 it took seven months to write and debug the necessary programs. Presently we are running 65 programs on the system, 17 of which pertain to the patronage and members' equity problem. We can write payroll checks to 50 employees in one hour and mail 1,300 monthly statements to patrons on the second work day of the month.

Customer statements are itemized in the language familiar to the customer so, for example, corn sales to the company is Corn Purchases to the customer.

The system also provides management with departmental preliminary profit and loss and balance sheets on the second work day of a month. The general ledger trial balance is also run on the first work day of each month.

Sales analysis and budget creation are two more key applications for the unit. In the budget applications the company uses the portable system in the conference room to directly input the departmental budgets and then print out results. Revisions made to the budgets during the year are easily incorporated.

Accounts receivable aging can be listed any time during the month. In addition, the system computes and writes checks to the member/owners showing a detailed history of their equity holdings in the cooperative. It also provides listings of warehouse receipts held by the customer either in alphabetical order or by number. Checks can be sorted on the system and listed in numerical order for easier bank reconciliation.

All of these applications plus the convenience of a computer that is simple enough for me and my three employees to operate has made me realize there are advantages to in-house computing. I learned how to program from the manuals that came with the computer.

The cost of the system was also very attractive. The basic system cost about $25,000. The software was written in-house. The maintenance agreement is $110/mo. Paper cost is about $25/mo. Total monthly cost, not including investment credit, using straight line five-year depreciation is $555.

The cost of the previous system, which was a CRT connected to a service center 500 miles away, was between $1,100- and $1,300/mo.

This is a savings of $650/mo, with no increase in personnel. The best thing is now we have a "feel" for the accounting we do because we do it all in-house.

Burke is an accountant with New Cooperative.

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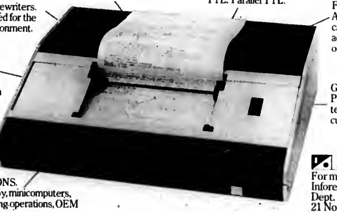

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Foreign Office Arrives at Mini, T/S Balance

(Continued from Page S/3)

Mark III services.

In our plants we installed Datapoint 2200 minicomputers with 5M-byte disk and 300 line/min printers to do order entry, invoicing, stock status and in-plant reporting. All applications were designed to be usable in all countries and screen formats can be compiled in different languages for different countries. The minis periodically transmit sales, production and other data to the Mark III service.

At our accounting/administrative offices the minis and the time-sharing service more equally share the functions as they interact to provide a total system. The minis are used by accountants to enter monthly accounting data. All editing is done interactively, contra accounts are automatically generated where possible, updates are made to exchange rates (all transaction data is entered in local currency) and maintenance to master files is performed.

When a transmission to Mark III is requested by the accountant (a logical function request, all control characters are supplied) all files are prefixed with the JCL or control data necessary to trigger the correct programs in delayed batch on Mark III. If any file maintenance was performed on the mini, this is now performed on the corresponding files at the time-sharing service.

All data or requests for processing sent from the minis in accounting offices are prefixed by Fips codes (nation identifiers) under program control. Therefore, all transactions are identified by country. This allows each accounting office to add or delete combinations of master data (account records, account/responsibility relationships, distribution algorithms without affecting other accounting offices in other countries.

Requests for reports such as a preliminary trial balance are also prefixed under program control. This allows the Cobol programs on Mark III to process only the data for that requestor, using only the proper portion of the master files and selecting those report headings corresponding to the requestor's language.

This gives all users the feeling that the system is fully under their control. Each user works under his own schedule without waiting until all users are ready to perform a given step, although they all share common time-sharing programs and files.

This combination of resources on our accounting system allows us to provide interactive processing to our accounting staff with minis, while having the resource of a large processor available when needed, particularly the first several work days of each month.

The monthly management reports are available to all users in Europe, and each user receives his selection of reports in the local language upon request. An added advantage of using the time-sharing service as the central processor is that it allows corporate headquarters in the U.S. access to data for consolidation and access to reports generated.

We also have the potential to add other overseas subsidiaries such as Mexico, South America and the Far East to our accounting systems as they all share the same chart of accounts, and the minicomputer programs can add their language screens to the library to facilitate processing in the local language.

Harper is manager, corporate planning at Johns-Manville Corp., Denver, Colo.

Minis Tackling Mainframe Jobs

(Continued from Page S/13)

adds a new interactive application to a batch-oriented mainframe system. In many cases, the cost of upgrading the system and converting the software is greater than the cost of the large-scale minicomputer system.

A federal government agency wanted to experiment with providing on-line terminal support for 50 to 75 users. To do this, it installed a supermini as a front-end processor to its existing mainframe systems. The mini system handles communications and shares the large number-crunching load with the mainframe systems.

A third type is the cost-controlled user, who has a job that calls for mainframe capability, but who does not want to commit capital to a very expensive computer.

An example is a New York City institutional investment management firm that replaced a small, outdated system with a large minicomputer. It now runs over 200 programs for securities research and analysis.

No list of large-scale minicomputer users can span the entire range of computer users. That's because large-scale mini systems are not the answer to every problem. Mainframes will, for example, probably be the best solution for the jobs they were designed for: the high-volume batch application.

But the user who must run programs that are typically 3 million bytes long, maintain data bases that run 1 billion or 2 billion bytes or support multiple simultaneous interactive users in several languages should certainly look at the large-scale

Rapp is program manager for interactive data processing at Prime Computer, Inc., Framingham, Mass.

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Produces Accurate Forecasts

Inventory System a Lifesaver for Marine Firm

RICHMOND, Va. — Tired of "borrowing" time on an IBM 3/10 from a friend on nights and weekends, Jeremy Crews, president of Marine Development Corp. here, decided to go in-house with a GRI-99 minicomputer.

"I got started on the IBM 3/10 about four years ago," Crews explained, "when we got into a real bind. Our annual sales were $2 million and we found ourselves with $1 million in parts inventory," he said.

"We couldn't get our billings out fast enough and we couldn't ship because we couldn't get parts," the manufacturer of boat air conditioning systems noted.

"Purchasing couldn't get parts because we hadn't paid our supplier's bills; accounting couldn't pay the bills because we had borrowed to the extent of our credit line to pay for our $1 million worth of parts on hand."

Crews began to design a manual parts forecast system. After it took three people four hours to develop a usage forecast for the first of 3,500 detail parts for the company's 600 products, he decided to seek an automated solution to the inventory trouble.

To try to bring the situation under control, Crews "borrowed" time on an IBM 3/10 from a friend and learned how to program the system himself. His friend didn't want just anybody from the company using the system, he explained, so he did all the work.

The effort was successful, he reported. For the first time the company knew the number of products each detail part was used to build, the number of parts on hand and how many parts should be purchased on what date to meet the production schedule.

The effort was successful. For the first time, the company knew the number of products each detail part was used to build, the number of parts on hand and how many parts should be purchased to meet the production schedule.

Tiring Schedule

"I got tired of nights and weekends" and decided to look for an in-house system, Crews said. The company examined several systems including the 3/10, which it dismissed as too expensive; the IBM 32, Burroughs B700, systems from NCR, Basic Four; and Logical Machines Corp.'s Adam system. He chose the GRI-99 because it came closest to having the flexibility and capability of the IBM 3/10 at "the right kind of price."

Another reason the company switched to the GRI machine is that it is cardless and "we didn't want to fool with cards anymore." Input on the GRI system is via CRT terminals, he noted.

The firm purchased the GRI-99 about a year ago from Automated Data Systems, the local GRI distributor, which also provides service for the system. Crews described the service as good.

System Configuration

The configuration includes a 24-byte CPU, disk drive, two CRT terminals and a 100 line/min printer. To expand the current system, the firm has ordered a third CRT terminal, a second printer and an additional 8K bytes of main memory.

Conversion to the system was straightforward; card files were transferred to disk storage. Because the local GRI distributor owns a duplicate model of the computer, the company was able to begin conversion even before its system 99 was delivered.

The firm's system now handles payroll, shipping orders, invoices, accounts payable, accounts receivable, vendor files, dealer files, cross-reference information, back orders and an overseas subsidiary's records, in addition to materials control.

"Our sales are twice what they were four years ago, but our inventory is down from $1 million to $400,000. Now we only stock the parts we need and we ship finished products on time," Crews said.

"I really appreciate the flexibility of this machine. We can set up files and reports just about any way we want. We can change programs and recompile right on the machine in just a few minutes. We can even set up a series of reports to run on an or/if basis so that the computer can decide which program should be run next without anyone being there to tell it. There are all kinds of things we can do," he said.

"I'm really convinced it's the best machine I could get for the money," Crews stated.

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Extensive Analysis Leads Firm to Mini Choice

(Continued from Page S/3)

last year," Bevis said, and dealt with the financial aspects, business aspects and two categories of technical requirements — those dealing with remote to host communications and those dealing with local processing.

At this stage, the company wanted a system that could do data entry in the foreground mode using from two to six terminals. "For local pocessing we wanted to have a high-level language facility and be able to run multiple applications. The on-line interactive access to the host today would consist of a dial-up 2,400 bit/sec bisynchronous IBM protocol. Tomorrow, we envision a multidropped lease line network using system network architecture (SNA)/synchronous data link control with detail," he noted.

To avoid repetitive questions after the RFP was issued, the firm set up a vendors' conference about two weeks later. At that time they requested the vendors follow the format specifically, both in exact section-heading and item number, so the firm could review the answers more easily, Bevis said.

The firm looked at the vendor's maintenance capabilities, vendor's stability, installed equipment base, flexibility and future direction. For hardware it. examined the general-purpose mini capabilities, multitasking, ease of program development, CPU architecture and the screen management and file structure used. "The technical requirement was primarily a statement on SNA development, Bevis said.

All the requirements were defined by quartile and the highest score any vendor could get was 40.

"We narrowed our group of 11 respondents down to six finalists (IBM, Four-Phase, Digital Equipment Corp., Microdata Corp., Datapoint, CA). From a paper standpoint, looking at the proposals and looking at all those points and adding them up . . . probably CA was near the bottom of the six finalists at that point in time," he noted.

Because the company wanted to "separate fact from fiction in their proposals," the firm decided to go through a benchmark evaluation.

"We would ask them to come in and install a system at Fireman's Fund for two or three weeks." This gave the company an opportunity to really ascertain the hardware performance, software capabilities, throughput and vendor responsiveness, he said.

"We had some really interesting results from the benchmarks," Bevis noted. "It really promoted a high intensity of competition. We had people knocking on our doors all over the place and calling everybody wondering what was going on. Some vendors were anxious to get their systems in benchmark and others were not too happy about that at all, because the equipment they proposed was not ready for us to benchmark.

Difficulties arose in comparing identical systems because some manufacturers did not have the highest end of the disk range, he stated. Another problem was the way some of the screens were used. Some of the systems had the screen formats within the system while in others the formats stored within the screen itself.

While the systems were installed the company ran several benchmarks. One to determine data entry performance measured the number of 50-character data records entered by six terminals in one minute.

Another benchmark measured file look-up. The insurance company generated a dummy file, measuring the number of screen images read from the largest file by six terminals in one minute. The CA system excelled in this one, Bevis said.

In still another benchmark the firm ran data entry, a disk file look-up printer spooler and measured the throughput of each of them running concurrently. The CA system also performed better than the others on this one, he said.

Because the company was concerned that no sooner would the systems be installed in the branches than the remote site would develop requirements heretofore unknown, it did an analysis of the cost of going from a small configuration to a larger configuration for each vendor.

"Finally we came up with an overall grid divided into four major categories: technical, financial, business and communications," he noted.

The selection was made on equipment the vendors had now, not any under development because, Bevis noted, the firm had been promised developments several times that never came to be.

The firm finally selected CA but was very concerned about the maintenance area, which was third-party maintenence. "The company was told it would have to come up with some rather creative and innovative solutions to compensate for what we thought then was a deficiency," he said.

CA agreed to put in four regional centers to sevice the 29 branches in addition to third-party Sorbus maintenance which is used in four cities.

The vendor also agreed to put in a network control center that has a Wats line for on-line diagnostics to the various branch offices staffed by CA personnel.

Company stability was also a factor. "We spent a lot of time with their people looking at their financial position and our financial people were very impressed," Bevis noted.

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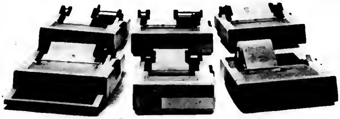

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What Basic 4, DEC, Microdata, Data General, etc. should know about distributors.

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Firm Selects Mini System For Control, Expandability

SAN JOSE, Calif. — The "typical situation in which the user doesn't know anything about computers" and trusts his applications to an outside service has been replaced at Employee Benefits Insurance Co. here with an in-house minicomputer that is firmly under the control of the user, according to Dana Brown, the firm's administrator of information services.

The company switched from the service to in-house programming after the programmers who were working on applications for EBI left the service company, Brown explained. What resulted was an in-house system destined to give the company more control over its applications.

Choosing the correct in-house system was an extensive affair, Brown said. The company looked at the IBM System 3, Hewlett-Packard 3000 Series II Digital Equipment Corp. PDP-11/70 under RSTS, the Prime Computer, Inc. 400, Data General Corp. Eclipse and Microdata Corp. Reality.

"We looked very hard at the Digital Equipment system" because Brown came from a DEC environment, but the software couldn't be justified. The Data General Eclipse was just beginning a data base management capability and the Prime system was "too young," he said. "We needed a system to run and be supported," he added.

The HP system was chosen on its data base management capability and Query software and also because "we needed a fast-moving computer system that could grow with us. We can build a distributed system with additional processors at branch offices later on. We can easily double our processing capability with a second processor," he added.

"The small system, like EBI, is young and not steeped in tradition. Many of the older insurance companies have large mainframes and it's extremely difficult for them to change directions in data processing," Brown commented.

"The distributed processing approach means flexibilty and it's affordable to us while leaving room for growth. It will be much smoother to go from a one processor system to a multiple processor system than it would be to go from a mini to a large mainframe. In the future, we can download operating programs from a central control CPU through the network to the other processors on the system. Programming would be made at the central system," he said.

Marketing Tool

Using the on-line system, members of the staff can retrieve claim details or summary information necessary to analyze accident or injury data. According to Brown, the on-line information system is an extremely useful marketing tool and a means of retaining a personalized and responsive claim service.

A claimant's question can be answered in seconds, such as whether a claim has been paid and when, and where the check was mailed. EBI managers can review the loss data and project trends and profitability.

By using HP Image/3000 and Query software packages, data storage, retrieval and manipulation can be performed without having to develop special programs, Brown noted. Listings of information that managers may be interested in studying are presented on the computer terminals — for example, all labor class categories for which the loss ratio (loss divided by premium) is greater than a given fraction.

The HP data base management software will respond to the Query language commands that employ such words as "find," "sort," and "report," by displaying all the desired categories. The user may then explore the least or most profitable portion of the business further by sorting in various ways and asking for more details.

"Being on-line is the key to service,"

(Continued on Page S/23)

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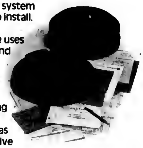

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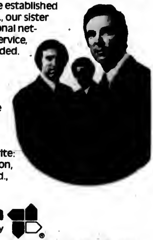

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Basic/Four Systems are also marketed in more than 30 foreign countries

32-Bit Minis on the Rise

(Continued from Page S/12)

more development energy and dollars on peripherals, software and interfaces.

The minicomputer manufacturer was inspired to respond to the system OEM because the product OEM market represented a decreasing source of unit volume profits as the price of CPUs and memories fell each year. Thus, manufacturers had to increase unit volume sales to maintain flat net profits. Peripherals and software were good sources for additional revenue. The systems OEM continued to supply applications software, special I/O devices and the human interface.

Most minicomputer manufacturers have dealt little with the commercial end-user market. Here, the computer system need not be particularly price/-performance competitive, but it must be designed for a nontechnical end user.

The system must be reliable enough to run around the clock, seven days a week and foolproof, with a simple human interface. Backup and recovery procedures must ensure that service is uninterrupted.

Seeking to repeat past successes, all minicomputer manufacturers are looking for commercial system OEMs to lead them into new markets. But there are not enough of them to go around, so the mini manufacturers are looking for marketing gurus to develop selected, delimited commercial markets.

Continued growth demands entry into the endless market of commercial applications. This marketing challenge has little to do with 16-bit vs. 32-bit word lengths.

The CPU hardware costs are a minimal factor in the commercial development. But the cost to develop the hardware/software interface to nontechnical users for a myriad of specific applications will be high.

Minicomputer manufacturers understand hardware. The 32-bit word presents fewer limitations than the 16-bit word. One can count on the minicomputer manufacturers to make the 32-bit word minicomputer dominate the minicomputer market.

Bartik is manager of marketing support at Systems Engineering Laboratories, Fort Lauderdale, Fla.

Mini Expedites Lab Procedures

(Continued from Page S/7)

a terminal to display the completed test information and verify it with the original work sheet.

During the day, two interim ward summary reports are printed containing all completed test results as of printing time. These are used by the team leader nurses. The final document for the laboratory is a printout of each patient's test data.

Once a day these printouts are delivered to the medical floors for inclusion in the patient records. Nurses no longer have to "chart" these results as the printout is sized to fit in the patient's chart. Lab reports for all patients are "charted" by one clerical individual on the midnight shift.

Meanwhile the laboratory system moves pertinent patient charge data in blocks of 23 records to the business computer for billing purposes and laboratory financial reports.

The microbiology section also shares the Medlab system, entering its test results on mark sense cards. This information is processed into the patients' records along with the other clinical laboratory data. It also provides the section with cumulative records and reports on the occurrence of bacterial infections.

Installation of the Medlab system was part of Mercy's ongoing building-block approach to the development of a completely computerized, integrated hospital information system. The hospital has a total of 500 beds, admits more than 18,000 patients annually and has a yearly outpatient load of 33,000.

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Dual Processor Support	YES	YES
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System Offers Small Firm Control, Expandability

(Continued from Page S/21)

Brown said. "It ensures that our data is accurate and current. Data input to the system is validated by the computer and becomes part of the data base. The system tells us immediately if coverage has expired, even if by only a few hours, for example," Brown explained.

One particular report that has proved valuable to EBI and its insured companies is called the "Loss Analysis Report." Here, a statistical analysis of problem areas is performed, pinpointing the characteristics of accidents at a company. For example, the report covers the time of day when the accidents are occuring, the months or days that are most common, the age of the employees involved, the type of injuries and the typical claim value.

Using this data and analysis, EBI can help its customers improve safety and reduce accidents thereby reducing the costs of workers compensation insurance and the amount of claimant litigation.

Staff More Efficient

While the workload at EBI has doubled in the past six months since the installation of the HP3000, not a single data entry person has been added. According to Brown, the main reason for the improved efficiency of the present staff is the on-line nature of the computer system.

One key application of the system is the printing of claimant checks. To do this, the HP 2645 display station presents a form called a "Claim Payment Entry Form" and the user then enters certain data onto the appropriate fields. The system does the rest.

By entering the claim number, for example, the system produces other data, such as name and address of the claimant, next check number, the company code number, etc. When the amount and payment period are entered, the check is ready to be written on the company check stock, which is placed in the printer. Some five forms are generated on the CRTs, including claim data entry forms for medical and indemnity claims.

The HP 3000 costs about $300,000 or about $8,000/mo. with maintenance. That's a small fraction of the cost of a large system besides the fact that it would not have been possible to have a large system installed, the software developed and functioning in two months. This could not have been done without the Image/Query pair," Brown noted.

The initial programming was accomplished by EBI programmer Barry Gleaton and two part-time programmers working with Cobol and Fortran.

Display stations are located in EBI offices in San Jose, Portland and Santa Monica, as well as in the homes of five of the staff members of the DP department. "Using dial-up lines, any of us can work on the system over the weekend or at night at our convenience. It permits us to deal with an emergency that might arise with a customer at the last minute," he explained.

"We selected the 2645 models [display stations] primarily because we expect to go into synchronous polled communications eventually and these terminals are capable of that using HP-DS/3000 software. The tape cartridge facility on the 2645s (also CRTs) is used for off-line data collection and entry later," Brown said.

EBI now has three offices equipped with data entry terminals and expects to have 12 offices on-line by the end of the year.

The hardware for the system includes the CPU with 512K bytes of memory, a 600 line/min printer, four moving-head disk subsystems with capacity for 50M bytes each, 25 CRT terminals, three 180 char./sec printers; a hard-copy facsimile machine that can copy a CRT screen and a Codex concentrator used for multiplex communications to Portland at 9,600 bit/sec.

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Designer's Challenge

Low-Cost Peripherals Needed to Fill Micro Gap

By Joel A. Kramer
Special to CW

The much heralded microprocessor revolution, which is supposed to bring digital intelligence to the very fingertips of commerce and industry, has produced "smart" games, washing machines, electric ovens, sewing machines, etc., but has done precious little to bring clerical automation to your friendly neighborhood drug store. In fact, very few ma-and-pa type businesses could justify today's cost of DP systems. This fact seems strange with microprocessors going for around $30 a clip.

Peripherals Bottleneck

The problem lies in the cost of peripherals, rather than the computing hardware itself. By and large, "smart" appliances don't require input terminals, output printers or data storage devices, whereas small business systems do.

The semiconductor industry's phenomenal ability to squeeze more and more circuits onto a tiny sliver of chemically processed silicon has produced a 1,000-fold decrease in the price of computing circuitry over the past decade.

Unfortunately, production costs for keyboards, CRTs, servomotors, print mechanisms and other peripheral "ingredients" are far less amenable to comparable price reductions.

The remarkable fact is that peripheral equipment manufacturers have been able to turn from equipment for multimillion dollar centralized DP systems to peripherals for the past decade's minicomputer explosion. Prior to the minicomputer's development, peripherals alone were priced at several times the cost of a typical mini: a $2 million computer could easily support a $35,000 line printer.

Consequently, until Centronics Data Corp. brought out its high-speed serial printer, minicomputer users requiring appreciable hard copy were obliged to purchese a $10,000-upwards line printer. That, along with other large-computer peripherals, left minicomputer users in the position of using a steam hammer to crack a nut.

Gradually, peripherals manufacturers rose to the minicomputer challenge, creating an entirely new generation of input/output/storage devices whose price and performance were geared to the mini's orders-of-magnitude lower cost and throughput levels.

In some instances, the mini's reduced DP horsepower permitted fresh peripherals approaches; in others, the growing pattern of distributed DP paved the way for new peripherals concepts.

Now the microprocessor brings a fresh round of challenges to the peripherals industry. Doubtless, it will spawn a new wave of entrepreneurial firms which, along with present-day contenders, will develop low-cost peripherals for microprocessor-based systems.

It's like a rerun of the earlier minicomputer revolution . . . except that today's minicomputer peripherals are the "biggies" that have proven uneconomical for ma-and-pa business automation.

Uniqueness of Market

The market size for computer systems is a direction function of hardware cost and can be portrayed as a pyramid as shown in Figure 1. The number of applications for computer systems increases as the number of users increase. At the apex of the pyramid we find the monstrous computer systems manufactured by IBM, Amdahl and the like that sell for millions of dollars and for which a limited user market exists.

Next we have the medium-scale computer systems, the requirements for which the IBM 360 series did such a remarkable job of fulfilling.

The third slice of the pyramid represents the minicomputer systems characterized by the Digital Equipment Corp. PDP-8 in the 1960s and the PDP-11 in the 1970s. To date, the installed mainframe base is in excess of 50,000 minicomputers of these types.

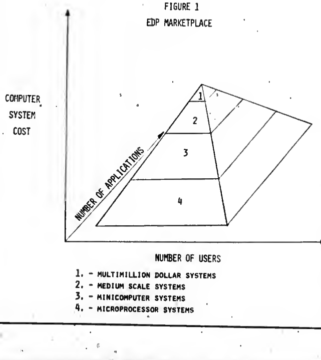
Widespread utilization of these machines was made possible by cost reductions in mainframes and the associated peripehrals. In many instances, these systems were utilized in an environment containing sophisticated technical personnel who could understand the complexities of the hardware and rationalize "downtime." A telephone call would dispatch a serviceman, usually within hours, to restore the system to normal operation.

Now, an entirely new breed of systems depicted by the base of the pyramid will be dispersed to the general public, which lacks the sophistication of the minicomputer user. As a

(Continued on Page S/26)

FIGURE 1

EDP MARKETPLACE



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MINICOMPUTER IPI SOFTWARE

Magnetic Media Prevail in Microperipheral Area

By Joel A. Kramer
Special to CW

The need for data storage on microcomputers has typically been filled by devices that employ magnetic media. A quick review of these methods is given below.

IBM-Compatible Reel-to-Reel Tape Drives: This method of data storage was the first implementation of removable magnetic media data storage. It ultimately became the backbone of the large centralized DP installations.

For tape velocities exceeding about 45 in./sec, designers developed vacuum column buffering methods. Recently, our firm developed the Model TDX 75 in./sec tape drive that uses a new mechanical rather than vacuum column buffering technique, called the Floating Shuttle, which we think overcomes the problems of operation at high altitude and restart after power blackout.

Philips Cassettes

Philips cassettes were the only game in town when minicomputer users first sought an economical alternative to the large and costly reel-to-reel tape storage systems. Consequently, despite the cassette's slow data transfer rate, poor data integrity and lack of mechanical reliability, it has gained fairly widespread usage among the less demanding applications.

Even with the low cost, however, the Philips cassette, in its modified digital incarnation, will probably prove to be a transitional device. It has provided a storage medium reserved for remote data logging, memory for automated typewriters, low-cost replacement for punched paper tape and so forth.

Floppy Disks: Approximately five years ago, the peripherals industry took a device developed by IBM as part of a programmable controller, known as a floppy disk, and converted it to a minicomputer peripheral. Needless to say, it was an instant success. For less than $3,000 one could implement a dual floppy disk system on a minicomputer. The floppy disk provides a capacity of 250,000 bytes of data with an average access time of 200 msec.

3M Standard Data Cartridge: About the same time that peripheral manufacturers were beginning to design their floppy disk units, the 3M Co. introduced its DC300A data cartridge. Unfortunately, when the media was first introduced there were no drives available.

It was approximately one year before the first drives were shipped, and surprisingly enough, Mohawk Data Sciences delivered before 3M. These units were followed by drives from other vendors.

Since that time, there has been a substantial movement toward industry utilization of the cartridge. Most notable of these is IBM with its Model 5100 desk-top computer, Tektronix with its graphic display terminals and Qantex with its U.S. Navy standard cartridge peripheral.

Microperipheral Storage Devices: There are basically two specific media types that are expected to capture the microsystems market, namely, the new miniature 3M DC100A data cartridge and the miniature floppy disk.

The miniature data cartridge was developed jointly by 3M, under its patents, and Hewlett Packard.

The first mini floppy was introduced by Shugart. Other drive manufacturers have also introduced miniature floppies.

A comparison of various storage media is shown in the figure. This comparison assumes a subsystem with the necessary formatter controller and power supply.

For the microsystem, power requirements will be handled by a total system power supply while the formatter/controller functions will be accomplished by use of LSI circuits.

Tape vs. Disk: The decision between media types requires the designer to perform a detailed analysis of the system requirements.

If rapid random access or fast data transfer is paramount, then the disk is the obvious choice. If data capacity, media durability and convenience, ease of long-term data storage and lower system cost are key requirements, then tape is the best choice.

Other crucial operating parameters might be the length of time it takes to validate a data block just recorded (read-after-write).

The minidrive with a dual-gap head can provide verification 5 msec after the last bit of data has been recorded. For many applications where throughput is important, such as data transmission over phone lines and real-time data logging, this is a critical parameter.

	Reel-to-Reel (10-1/2 in. Reel)	Cartridge (3M DC300A)	Mini-Cartridge (3M DC100A)	Phillips Cassette	Floppy Disk	Mini-Floppy Disk
Capacity (1,000 bytes per block for tape, 128 bytes per sector for disk)	25×10^6	2.5×10^6	560,000	225,000	250,000	88,000
Data Transfer Rate (Typical bit/sec)	250,000	48,000	48,000	10,000	250,000	125,000
Access Time (Average)	10 min.	20 sec.	10 sec.	20 sec.	200 msec	566 msec
Transport Size (Typical)	19x12x12	4x10x7	4x3x4	4x5x6	10x4x16	3x6x8
Cost (With power supply and formatter)	$5,000	$2,500	$1,200	$2,200	$2,500	$1,300

Comparison of Various Magnetic Recording Subsystems

Beware of Analyses

(Continued from Page S/4)

and systems courses available have encouraged businessmen to familiarize themselves with computer system considerations. They develop a vocabulary and confuse that with knowledge.

Proverbially, a little knowledge is a dangerous thing. It would be foolish to tell a businessman to endeavor to keep himself totally ignorant of minicomputer considerations. On the other hand, unless he is willing to devote several years of fulltime effort to becoming an expert, he should endeavor to seek such an expert in making technical evaluations.

The difference between meaning and data is more than one of semantics. Frequently, it is one of dollars and cents and of success or failure.

David is president of Minicomputer Industry National Interchange, an association for minicomputer users and others interested in minicomputer technologies. He is also an independent consultant based in Englewood, N.J.

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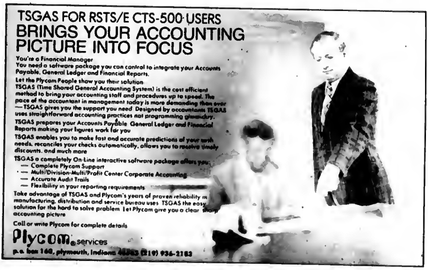
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Small System Unbundling Eroding User Rights

By Lawrence Feidelman
Special to CW

Small computer system architecture is evolving toward implementing more processor functions in software while reducing the proportion of hardware.

In particular, the system software associated with the newer small business computers includes multiterminal, multiprogramming operating systems, microprogrammed logic, utilities, assemblers, compilers for basic programming languages such as RPG-II, Cobol, Basic, as well as businessman English language. In addition, most manufacturers are supplying application software with turnkey systems.

While this situation is definitely beneficial to the small businessman from a technical viewpoint, there is one hitch in this otherwise rosy picture.

The trend is toward unbundling or separately pricing system software. The term unbundling came into being in the early seventies when various outside pressures (if you can believe it) caused IBM to separately price its equipment and software components.

However, the separate software pricing affected only the compiler, utilities and application software. The unbundling of the application software was the most logical step for vendors to take since application packages must be modified on a customer basis.

As the demands of application program packages for the small business system user began to increase, licensing of software became important.

While no standard software license exists, all of the licensing agreements are designed to restrict the use of the application software package to a particular user on a particular system and to prevent that user from copying the package or reselling it to another user. The basic purpose is to prevent the user from distributing easily made program copies and thereby severely damaging the software developer financially. The DP industry needed to develop licensing due to the inability of the legal system to effectively deal with this software copyright problem.

While licensing has provided an answer to a definite need to protect illegal copying of software, it also has placed some heavy restrictions on the unknowledgeable user.

While the user is paying a sizable amount of money for application programs (which eventually may cost more than the computer system), these programs, unlike the computer, never belong to the user.

The reasoning behind this practice became more a matter of marketing concern than concern over copyright protection. Thus while the user can resell his CPU, magnetic tape drive or printer, reselling even the restrictive single program is not permitted. Most users take this situation in stride and go along with the software licensing agreement.

Recently this separate pricing and licensing of software went one step further — to the operating system itself. The announcements of the Burroughs Corp. B80; IBM System 34 and NCR I-8250 all stated that the operating system is separately priced and licensed. By licensing the operating system, the manufacturer can affect the resalability of the purchased system.

While passing on the operating software to a new user may be just a formality, it appears that the manufacturer still has the final word. While manufacturers claim that software companies can develop operating systems for their computers, it is certainly more difficult and expensive. Therefore, the purchasing user has only rights to the computer hardware that cannot operate without the software.

Following this trend in computer-development to its conclusion, users will discover that most of their systems will be operating under licensed system software and the user will have rights to very little, while paying for everything.

This trend demonstrates an evolving erosion into the computer buyer's rights with nary a wimper from anyone. The small business computer user may be too unknowledgeable or inexperienced to understand this situation. User groups also appear to be very apathetic. As with the previous form of licensing, user inaction will be taken as concurrence by the manufacturers and new forms of computer licensing may be introduced.

It is about time the small business computer users stood up for their rights and got some protection.

Feidelman is president of Management Information Corp., Cherry Hill, N.J.

Peripheral Cost Causes Problem

(Continued from Page S/24)

result, the demands for system reliability are significantly increased.

This end user will not tolerate hardware that requires excessive maintenance or frequent, expensive service calls. The user demands the reliability that his typewriter or calculator achieves. Such a combination of low cost and extremely high reliabiltiy at first seems mutually incompatible.

Therein lies the peripheral builders' major design challenge. Not only must the hardware be offered at low cost, but the system or peripheral must be designed for high "user operational" reliability.

Kramer is president of Qantex, North Atlantic Industries, Inc., Plainview, N.Y.

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Turnkey System Turns Around Account Woes

Special to CW

GARDEN CITY, N.Y. — A turnkey small business system at ABC Hanger and Supply, Inc. here has helped this firm gain control over its accounts receivable and inventory, according to Howard Schulman, vice-president.

The firm, which furnishes ready-to-wear retailers with supplies ranging from hangers to wrapping aids, ships and receives its orders through the mail.

Until April 1976, the $2.5 million company struggled through invoicing with one Friden and one Hermes billing machine. At that time the firm was invoicing customers two and a half weeks after the merchandise was shipped. The merchandise went out on time, but not the invoice, Schulman noted.

Seeking a better alternative, Schulman opted for an IBM System 32, expecting that order entry, accounts receivable and invoicing could be speeded and customer service improved. He hoped to automate inventory as well.

Schulman accepted the System 32 with a 3741 data input station and the accompanying MNAS program. The company was never able to get past order entry and invoicing in nine months with the customized package purchased from IBM.

Schulman hired two extra people who spent every morning assigning account numbers. They punched numbers in, but if nonvalid numbers were entered, they did not find out and merchandise was shipped to the wrong customer. As a result, extra people had to be hired to edit the already entered orders, he added.

Enough Is Enough

By September 1976, Schulman had had enough and looked for a better way. He saw just about every minicomputer manufacturer's system including Basic Four Corp., Nixdorf, Digital Equipment Corp. and Burroughs total responsibility "turnkey" system was the objective, Schulman said.

In November 1976, ABC was contacted by Turnkey Sales & Leasing, Inc., a New York City-based distributor of minicomputer systems. Schulman visited two user installations, saw a demonstration and made the decision to switch. The turnkey house evaluated the company's needs and recommended the Microdata Corp. Reality system.

"Even though their price was $10,000 higher than the other systems we felt it was worth it," Schulman reported.

"Interactivity, immediate real-time response, ability to do whatever we wanted, whenever we wanted it done, was important in the selection," he noted. "Turnkey's approach of providing a system on a customer requirement basis, the use of English and the versatility in extracting information from the system were the things that impressed me," Schulman stated. "Turnkey didn't try to put me into the computer business," he added.

Schulman ordered the Microdata Reality system from Turnkey on Nov. 15, 1976. The system was delivered on schedule, Feb. 9, 1977. In six days, the entire system was operational. After one week, the system processed 1,400 orders and billed 1,000 customers in 10 days.

Sales analysis enables ABC to prepare its catalogs based on which items are selling. Invoices are in the mail the day after shipment so the customer can verify the items and quantities, he ordered and know when and how his order was shipped. Cash flow has improved and credit checks are accurate, Schulman said.

The system also segregates custom items from drop-ship items and warehoused items and will create purchase orders to suppliers of the "specials." Stock items are put on a picking list.

Also, with certain items which are not warehoused on a regular basis, but brought in for shipment, the system recognizes these items, prints them on a picking order and creates a purchase order for vendors with instructions to ship them into ABC's warehouse.

The system also accommodates quantity price differentials and is able to price out any item. The system maintains price breaks as they relate to quantity and posts the right price.

Prepaid Accounting

Another important facet is the handling of multi-item, prepaid orders. The amount of the payment is carried in an order file. Cash is applied to the first shipment.

For example, if a prepaid order for $100 is received and the first shipment is invoiced for $50, the system issues an itemized paid invoice which totals $50 and details $50 credit remaining on the account. If the second shipment is for another $50, the system again issues an itemized paid invoice and states "zero balance." If the second shipment exceeds the outstanding balance (e.g., a $70 shipment), the system issues a paid invoice of $50 with a "balance due" of $20. Account statements are issued at the end of each month.

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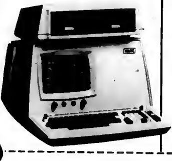

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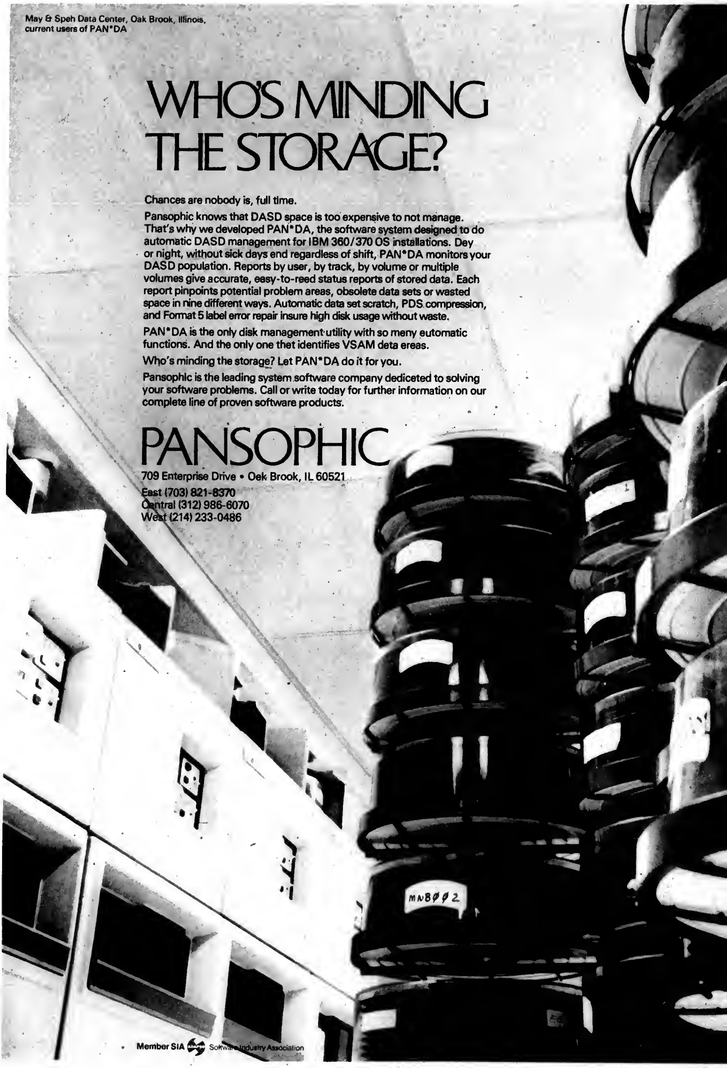

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Micro Bytes

8080 Code Handbook Catalogues Functions

VAN NUYS, Calif. — The *Programmer's 8080 Reference Data Handbook* by West Pulse Engineering here features cross listings for rapid assembly and debug of machine code mnemonics, according to a spokesman.

The handbook has listed the 8080 instructions by functional groups: data movement, arithmetic, logical, control and branching. A complete listing of the 8080 instructions by hexadecimal and octal order as well as an alphabetical listing are provided. The instructions are also classified according to format.

The book provides notes about the unassigned Op-code, full 128-character Ansi Ascii code table with hexadecimal and octal cross conversion, octal and decimal conversion, hexadecimal and decimal conversion and powers of 2, 8 and 16.

The handbook costs $7.95 with quantity discounts available, the spokesman said from 14632 Erwin, Van Nuys, Calif. 91411.

Micro 'Recipe' Book Bows

SAN FRANCISCO — The *Microcomputer Recipe Book* from the Computer Center, Inc. contains information from soup-to-nuts on putting together a microcomputer operating system for personal, business or scientific use.

Under "Ingredients" there are a variety of system components such as microcomputers, semiconductor and floppy-disk memories, CRT displays and hard-copy printers. Suggested "Menus" for complete systems range from the "Big Mac," a simple 8080-based computer hooked into the family TV set, to the "Beef Wellington," which includes microcomputer, dual floppy-disk memory, printer and video monitor.

In addition to the menu of computer systems, the recipe book includes a listing of technical books related to hardware design, software development and "How to Do It" books.

The book is free from the Computer Center, Inc., 321 Pacific Ave., San Francisco, Calif. 94111.

Design Manual Covers MCS-48

SANTA CLARA, Calif. — Intel Corp. has announced the *MCS-48 Microcomputer User's Manual*, a 304-page design handbook.

The manual covers design of systems based on the MCS-48 family of single-chip microcomputers, which includes the 8048 microcomputer with read-only memory (ROM) program storage, the 8748 with erasable programmable read-only memory (Eprom) program storage, the 8035 microcomputer and the 8243 I/O expander.

Sections cover microcomputer operation, the use of compatible 8080 and 8085 system peripherals, standard memory components for expansion and both hardware and software applications examples. Data sheets and instruction set are also included.

Copies may be obtained for $5 from the Literature Department, Intel Corp., 3065 Bowers Ave., Santa Clara, Calif. 95051.

Mits/Altair to Sell Icom Line

WOODLAND HILLS, Calif. — The Icom brand of microcomputer peripheral products will be sold in all Mits/Altair retail computer stores, according to a spokesman for Pertec Computer Corp. Pertec manufactures Icom products.

Wintek Hands-On Course To Use Take-Home Micro

LAFAYETTE, Ind. — Wintek Corp. is offering a microprocessor workshop course in which each attendee receives a microcomputer to use at the course and then take home.

The three-day course has both lectures and lab experiments. Topics include computer basics, microprocessor units, memory, I/O, microcomputers, addressing modes, programming, programming aids, processor evaluations and selection, economics, applications and interfacing techniques.

Lab experiments include Fantom-II familiarization, stack pushing and pulling, delay loops, interrupt handler, editor, sort, random number generator and Morse code decoder.

11 Cities

The course will be offered in 11 cities through the end of the year. In six cities, the course will be expanded to include a two-day hands-on interfacing workshop. It consists of analog-to-digital and digital-to-analog conversion, signal conditioning, keyboard scanning/decoding, LED display driving, motor position and velocity control.

The three-day course schedule is:

Sept. 14-16	Dallas, Texas
Oct. 11-13	Melbourne, Fla.
Oct. 18-20	Denver, Colo.
Oct. 26-28	Palo Alto, Calif.
Dec. 6-9	Detroit, Mich.

The five-day course schedule is:

Sept. 19-23	Houston, Texas
Sept. 26-30	Washington, D.C.
Oct. 31-Nov. 4	San Diego, Calif.
Nov. 14-18	Indianapolis, Ind.
Nov. 28-Dec. 2	Boston, Mass.
Dec. 12-16	Chicago, Ill.

A special three-day course will be held Jan. 3-5 at the University of Puerto Rico at Mayaguez.

The three-day workshop costs $499 and the five-day workshop costs $699. The two-day course alone costs $299 and the special January course costs $599. Prices include tuition, course book, all course materials, graduation certificate and take-home microcomputer. A 20% discount is available with five or more enrollments from the same firm. For information, contact Wintek at 902 N. 9th St., Lafayette, Ind. 47904.

8800b Gets Data Base System

BLACKSBURG, Va. — The Personal Data Management System (PDMS), a data base system for personal microcomputers, has been developed by Physical Biological Sciences (PBS) Ltd. here.

The first PDMS system is for the Altair 8800b with one or two floppy disks at a minimum of 32K bytes of core memory. Additional versions for cassette systems are under development, according to a spokesman.

The interactive PDMS system allows the 8800b user to set up a new file by issuing a RUN command. Once the file is set, the user may ADD, LIST or DELETE records in sequence or selectively. A RESTORE command actuates previously deleted records. A CHANGE command allows changes to be made in existing records of a file, and a SEARCH command searches a field for a string as well as an integer value of fields, the spokesman explained.

A 40-page user's manual, when provided with the system disk, contains the source listing of the program. The PDMS costs $795 from the firm at P.O. Box 47, Blacksburg, Va. 24060. The manual without source code can be purchased for $20.

Two Boards Expand Z80 Series

CUPERTINO, Calif. — Zilog, Inc. has expanded its family of Z80-based microcomputer boards (MCB) by adding a video display board, an I/O board and a serial I/O board.

The Z80-VDB video display board interfaces Zilog's standard Z80 microcomputer board directly to the transistor-to-transistor logic (TTL) horizontal, vertical and video drives of a standard TV monitor. Containing 256 bytes of dynamic random-access memory (RAM) for line buffering to the MCB, the board accommodates 64 upper-case Ascii characters and display size of 24 lines, 80 char./line. Price of the Z80-VDB is $475.

The Z80-IOB board provides users with programmable control of up to 64 I/O lines. The board, containing four Z80-PIO parallel interface controllers, sells for $350.

The Z80-SIB serial I/O board provides eight serial (four full-duplex) channels, each capable of synchronous or asynchronous data transmission including Bisync protocol. Featuring two on-board Z80-CTC programmable timers, the Z80-SIB is priced at $375 from Zilog at 10460 Bubb Road, Cupertino, Calif. 95014.

Microcyber 1000 Based on 6502

HUNTSVILLE, Ala. — Cybersystems, Inc. has introduced the Microcyber 1000 microcomputer system. The Micocyber 1000 is based on the 6502 chip and comes assembled and ready to plug in, according to a spokesman.

The unit includes 1K of random-access memory (RAM) and 2K of read-only memory (ROM). The ROM contains the operating system for the cold-start bootstrap, teletypewriter handles, keyboard and display handlers and audio cassette handlers, he said.

The Microcyber 1000 comes with a full hexadecimal keyboard and 7-digit light-emitting diode (LED) display for address and data. A single-board expansion capability is contained within the basic chassis and the expansion can be either memory or I/O board. A 72-pin I/O and memory expansion bus connector is included with the system to permit further expansion, the spokesman added.

The Microcyber 1000 sells for $525 and comes with a 90-day warranty. Additional static RAM is available in 4K increments for $189 and in 8K increments for $299 from the firm at 4306 Governors Drive W., Huntsville, Ala. 35805.

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Micro Club Listing

Microcomputing clubs are drawing more and more interest all across the country. It is sometimes difficult, however, to find one that serves your area of the country.

As a service to hobbyist readers, *Computerworld* would like to periodically list the micro clubs in different parts of the country.

If you are a member of a microcomputer club and would like it to be listed, contact Frank Vaughan at *Computerworld,* 797 Washington St., Newton, Mass. 02160.

Please provide the full name, address and telephone number of the club.

Micro Stores 17K Bytes

NATICK, Mass. — A Z80-based single-board microcomputer with a capacity for 17K bytes of on-board memory is available from Control Logic, Inc. here.

The CCS-1143 contains the Z80 microprocessor unit (MPU), 1K byte of random-access memory (RAM) and sockets for up to 16K bytes of erasable, programmable read-only memory (Eprom). It also has a serial interface for either current-loop or RS-232 serial devices, a 2MHz system clock and MPU support hardware and logic for I/O to users' devices, a spokesman said.

The unit is suitable for applications requiring large program or fixed data memories such as control or switching uses, the spokesman said.

The memory-mapped and bussed I/O structure of the CCS-1143 permits the user to employ the memory reference instructions of the Z80 MPU, according to the spokesman.

Additional features include automatic power-on restart, jumper-selectable serial I/O data rates, interrupt capability and direct memory access.

The CCS-1143 costs $500 from the firm at 9 Tech Circle, Natick, Mass. 01760.

Package Handles 3D Perspective

CULVER CITY, Calif. — Sublogic Co. here has introduced a micrographics package that allows a user to view two-dimensional perspective projections of three-dimensional scenes from any locations in space, a spokesman claimed.

Two versions of the graphics package are being offered.

Adaptation instructions, program listings, applications, interface and testing information are supplied with each package. The Basic version will retail for $22 and the 6800 Assembly Language package will cost slightly more from the firm at P.O. Box 3442, Culver City, Calif. 90230.

MICROCOMPUTING CLASSIFIED EXCHANGE

This special classified section in solid (non-display) format is designed for people who are working with or interested in microcomputing. Through it, you can buy, sell or swap equipment software or services; contact people with similar interests; start clubs; disseminate information; look for game partners; or send messages to other individuals. As the number of ads increases, this section becomes more useful; so we've tried to make ad placement as simple and inexpensive as possible. Details are as follows:

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Withington Testimony

IBM Could Force Others Out: Trial

By Molly Upton
CW Staff

NEW YORK — IBM has the financial resources to put a variety of firms out of business, computer industry expert Frederic G. Withington testified at the U.S. vs. IBM trial here recently.

If IBM were to make products designed specifically for users of Burroughs, Honeywell, or Univac systems and price them low enough, it could force these firms out of business and survive, the Arthur D. Little, Inc. researcher said.

And, IBM could similarly force out of business plug-compatible suppliers in the areas of add-on memories, tape and disk drives and CPUs and still be alive, he added.

Much of Withington's testimony on redirect examination has been devoted to his predictions. Judge David N. Edelstein queried him extensively on the significance of such items as new memory technologies and IBM's use of microcode.

Since Amdahl Corp's 470V/6 lacks a control store, there is no way it can provide the equivalent to IBM's MVS extension Withington noted. IBM's MVS extension incorporates some systems programs in microcode in the control store for reportedly greater throughput, he said.

Withington expects IBM to increase the number of key systems programs in microcode, thus rendering hard-wired machines incompatible.

Edelstein asked Withington whether he considers the use of microcode a "technological miracle" that could hinder entrance into the computer industry.

Withington said no, not in itself. However, in the future, it is conceivable that microprogramming could seem close to a technological miracle, he said.

Edelstein used the term "technological miracle" to refer to a technique that incorporates price/performance, compatibility and functionality or ease of use, Withington explained later.

The judge also asked Withington whether the mirocode expected to be released with the IBM 3033 could be copied. The witness estimated five or 10 people could "replicate a functional alternative" in six months to a year if they had the code with which to work.

Other mainframers have more ways of being competitive with IBM than the plug-compatible mainframers, which must either duplicate IBM's CPUs or make their products look like duplicates he said. The other mainframers can select a variety of methods through which to offer equivalent or better price/-performance.

Withington suggested that perhaps other mainframers might make more suitable markets for plug-compatible mainframers than IBM, since several plug-compatible mainframers are already concentrating on IBM.

The general-purpose systems of Honeywell, Univac and Burroughs are lower in price than IBM's and their installed bases are smaller. As a result, they probably have less leeway in cutting prices — and in innovating new products — than IBM does, he indicated.

Disk drives of an improved sort will remain the dominant memory technology through at least 1985, Withington said.

Adaptation Cost

The cost to one company to adapt or develop systems to use these different technologies, which organize the storage of data in smaller blocks will be $10 million to $50 million, Withington estimated. Two-thirds to three-quarters of this expense will be in software, he added.

Lead government attorney Raymond M. Carlson produced two IBM documents that substantiated Withington's earlier testimony that it would have cost about $300 million for a firm to

Continued on Page 43)

Telecommunications Seen Ripe For More Mini Firm Participation

By Toni Wiseman
CW Staff

CHICAGO — The telecommunications industry is ripe for increasing participation by minicomputer companies, Harry Newton, an independent telecommunications consultant, told top industry executives here.

Minicomputer companies have the technology and the problem solution and industry segmentation marketing skills to make a significant impact on this industry," Newton said at the Computer & Communications Industry Association's (CCIA) annual membership meeting.

Yet, despite the available enthusiasm, marketing and technical skills, only two companies to date have ventured actively into the voice area as end-user suppliers. These two are Rolm Corp., which markets a computerized PABX, and Datapoint Corp., which has developed InfoSwitch, a mini-based least-cost telephone routing system, he said.

Newton compared DP with communications, pointing out that the telecommunications market is 50% larger than that of DP.

Telephone industry revenues, for instance, were $41.19 billion in 1977. This includes $16.6 billion in local exchange revenues, $1.5 billion from interstate toll and Wats, $1.2 billion from interstate private lines, $8.3 billion from intrastate toll and $3.7 billion from PABXs and key sets.

DP industry revenues, on the other hand, amounted to only $27.9 billion in 1977, he noted. Mainframes accounted for $7.2 billion; peripherals for $10.8 billion, software and services $5.1 billion, supplies $2.4 billion and minicomputers $2.4 billion.

R&D Orientation

Another reason minicomputers have a definite opportunity in the voice telecommunications industry is the intense R&D orientation of the DP industry as compared with telecommunications firms, Newton said.

In 1975, AT&T spent $619.4 million or 2.1% of sales on R&D, General Telephone and Electronics spent $93.7 million or 1.6% of sales, ITT spent $219 million or 1.9% and RCA $113.6 million or 2.4%.

In the same year, Data General Corp. spent $11.6 million or 10.8% of sales on R&D, Digital Equipment Corp. $48.5 million or 9.1%, IBM $946 million or 6.6% and Hewlett-Packard $89.6 million or 9.1%, he stated.

But, the profitability of the communications industry is very, very high and thus very enticing, he pointed out. IBM realized a 14.7% profit in 1976 while AT&T accumulated an 11.6% profit on sales that year. This compares with an average 5% profit for the Fortune 500 companies, Newton said.

Newton further compared the two giants, IBM and AT&T, in terms of revenues, expenditures and depreciation issues.

For the year ended December 1976, AT&T had revenues of $32.8 billion, or 2.01 times IBM's $16.3 billion. AT&T's earnings were $3.8 billion or 1.58 times IBM's $2.4 billion, he noted.

On the other hand, AT&T's long-term debt is $32.5 billion, 118 times IBM's 275 million, which is in itself negligible since IBM had $6 billion in cash assets at the end of the year.

AT&T's total plant and equipment amount to $91.3 billion but will take 20.3 years to depreciate at the 1976 rate, Newton said, adding IBM's $16.1 billion plant and equipment will take only 9.4 years to depreciate at the 1976 rate.

Buyer Conservatism

But the major concern with marketing to the end-user in the telecommunications industry has been the erstwhile conservatism of the average communications buyer, Newton told the CCIA members.

However, this is changing; interconnect's present popularity is growing for several reasons:

- The manufacturers are offering equipment with popular features not available from the telephone companies.
- The manufacturers are standing behind their distributors, backing up installations with manufacturer guarantees.

(Continued on Page 42)

CI Notes

Itel, Siemens Agree To Joint Project

SAN FRANCISCO — Itel Corp. has entered into an agreement with Siemens A.G. (Germany) for the joint development of IBM-compatible nonimpact laser printer subsystems.

Itel intends to add products developed under this agreement to its existing computer and peripheral line.

The initial Itel printing subsystem will utilize the ND-2 laser printer, a product designed and manufactured by Siemens A.G., and will be plug-to-plug compatible with the IBM 3800.

Dataforce Takes Control Of Randal Maintenance

TORRANCE, Calif. — The Dataforce Service Co. has taken control of a nationwide network of 115 organizations providing maintenance for Randal Data Systems small business computers.

While it intends to continue providing service to Randal Data, Dataforce will also seek maintenance contracts for other types of minicomputer systems, according to Dataforce president, Jack Tateel.

A central diagnostic center has been established at Dataforce's headquarters, 2807-F Oregon Court, Torrance, Calif.

The company is wholly owned by Randal Data Systems, Inc., but will operate independently.

Supershorts

Centronics Data Computer Corp. has filed a claim against Mannesmann and SCI with the U.S. International Trade Commission demanding an import embargo on the printers.

— — —

Data Magnetics Corp. has formed a Tape Products Division to handle the manufacture and marketing of a new line of digital tape heads.

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Army Cancels CDC System As Interim DOD Standard

By Edith Holmes
CW Staff

WASHINGTON, D.C. — The Army Electronics Command recently canceled its sole source designation of Control Data Corp.'s 480 system architecture as the interim standard for all U.S. military operations.

In the wake of industry criticism, the Army plans to go out for competitive bids to select the interim tactical computer architecture that will serve as a basis for the Military Computer Family (MCF) to be used by all branches of the Department of Defense (DOD), a spokesman for the command said.

Digital Equipment Corp.'s PDP-11 has already been selected by the command as the ultimate standard MCF architecture [CW, Aug. 8], the spokesman added. But since few militarized PDP-11 CPUs are currently in the field, the Army is trying to find an interim architecture to save existing tactical computer systems.

The computer industry was informed in July that the Army, in cooperation with the Navy, had chosen the CDC 480. Army officials said the 480 was selected as the interim machine architecture because it is compatible with CDC's AN/AYK-14 standard Navy airborne computer and Litton Industries' AN/GYK-12 emulator.

Industry representatives objected strenuously to the DOD move toward CDC during a July industry advisory group meeting. Competitors argued CDC would gain a lead position in the eventual supply of hardware modules to the military if the features of its equipment were made standard without "a thorough objective and written analysis."

Mini Users Gain Special Support

ANDOVER, Mass. — Software International Corp. has formed a new group devoted exclusively to software package support of small systems and minicomputer users.

"Users of small computers, just like those who employ large-scale machines, are faced with making their machines produce application results. Since the cost of in-house or contract programming can be prohibitive, small systems users should be able to take advantage of field-tested and proven software application packages," according to Chester J. Domoracki, small systems group vice-president.

With more than 100 installations of Software International's small systems packages already at work on various sizes of IBM System 3 computers, the firm is now designing a broader product line offering. Software International's general ledger, accounts receivable and accounts payable are already on the market with on-line versions as well, Domoracki noted.

Basic financial reporting systems for the following popular small or minicomputer manufacturers are either available or being planned from Software International's new small systems group: Burroughs, Digital Equipment Corp., Data General, Hewlett-Packard and Interdata. The needs of IBM System 32 and System 34 will also be met soon," he said.

Milgo Name Change

MIAMI — Milgo Electronic Corp. has been renamed Racal-Milgo, Inc. as a result of its merger into the Racal Group.

Edward Bleckner Jr. will serve as president of Racal-Milgo, along with Raymond Colucci, vice-president/operations; Matthew A. Kenney, vice-president/sales and marketing; Paul E. Payne, vice-president/engineering; Charles Weston, vice-president/finance; and Sang Youn Whang, vice-president/research.

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Panel Sees Eventual Standards For Graphics

By Toni Wiseman
CW Staff

TORONTO — Members of an Ifip '77 panel on computer graphics agreed that there is an exciting future in store for that discipline, one which includes discernible trends, innovations and the certainty of standards.

K.Bo, who participated in the development of GPGS/Fortran in Norway, said he foresaw three trends, the most important of which is that computer graphics are penetrating into industry. Even smaller firms have begun to recognize what they can gain from using computer graphics, he said.

He noted, however, that to reach the goal of widespread use of graphics it will be necessary for the DP industry to support development, increase knowledge and provide standards.

Secondly, Bo noted that one reason computer graphics have encountered difficulty in widespread use is due to the isolation of the educational world, which is the prime user of the technology. "To get individuals to accept computer graphics, we have to offer them professional implementation, education and maintenance," he stated.

Finally, while technology has a good grip on the control and understanding of line graphics, it is a primitive usage, he said. Graphics today are using one dimension to stimulate two- and three-dimensional objects. In the future, he predicted, two-dimensional primitives, such as polygons, will be common.

"This field is now moving very fast. In order to keep up, I urge you to keep an eye on the raster scan approach and on holography," Bo said.

Changing Slowly

Tom Sancha, founder of Cambridge Interactive Systems, Ltd. in Great Britain, tried to tread the line between what will happen in the future and what should happen.

Sancha divided graphics into two "worlds": the old world of vector graphics and the new world of raster graphics. Vectors will diversify as more things become possible through the application of LSI technology, he predicted. There will be changes, but they will not be radical, he said.

In the raster area, the changes will come from the low end of the market. "Rasters will probably never compete with vector graphics, for instance in engineering, he noted, because the requisite resolution is not available. But the use of enhanced video display units will prove very cost-effective and cause the raster market to take off," he said.

He also predicted that as graphics terminals become more widely used within organizations by more users, the demand for hard copy will diminish — a prediction one attendee termed "naive."

Standards, he observed, are the only way to provide wide availability of applications. These standards, he added, will be adopted by government and large industry and will constrain the user, "but we'll have to live with them."

Jim Foley, graphics editor for the Communications of the ACM, agreed that standards are coming, setting a five- to 10-year time frame for their implementation.

Standards, he said, will result in relative program portability and eliminate the need for major program changes. They will also result in program affordability, a major and practical impact for the expansion of computer graphics.

There are currently five separate groups working on graphics standards projects, all working closely together and cooperating toward the same objective, he said. To date, however, only a single standard — one for line drawing systems developed by the ACM Siggraph group — has been proposed.

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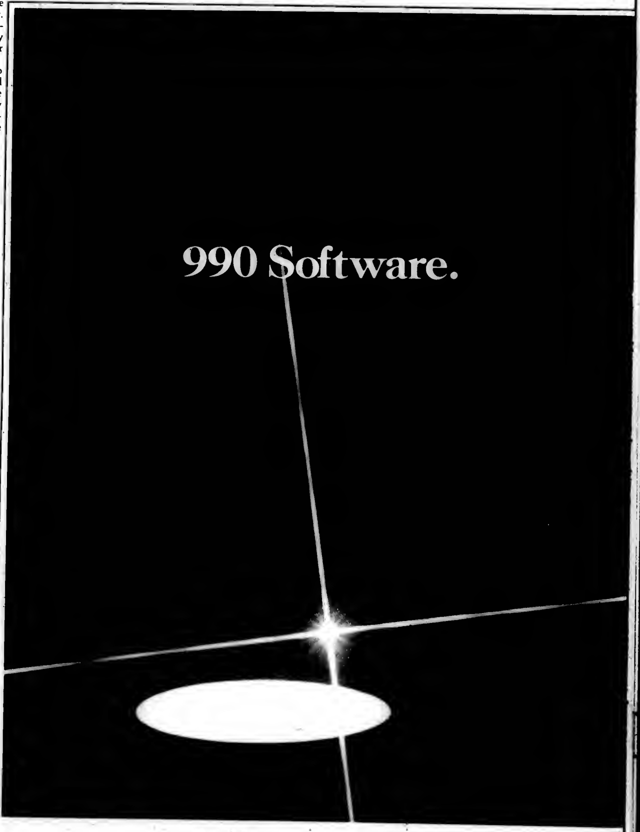

990 Software.

Small Systems Becoming Chief Market

Floppy Media Sales Seen Climbing 40%/Year

By Molly Upton
CW Staff

WELLESLEY, Mass. — Shipments of floppy disk drives should rise at an annual rate of 33% over the next five years, while diskettes will rise 40% per year over the same period, according to a study from Venture Development Corp. here.

In 1981 the drive market should reach 605,000 units per year and sales of diskettes 18.7 million per year, the study indicated.

The 1976 base of drive shipments was 145,000 units and the media sales were 3.45 million units, according to the report.

Over half of the drive shipments in 1981, or 392,000 units, will be of the IBM-type from OEMs, compared with 103,000 in 1976, Venture indicated.

The only segment of the drive market which will not expand is the non-IBM full size, which should dwindle to nearly zero in shipments by 1981, according to the firm.

The other segments, such as the IBM captive, OEM-IBM type and minifloppies will continue to grow, Venture continued.

Shipments of minifloppy drives will grow from 1,000 units in 1976 to 76,000 in 1981 and should find wide application to hobby computers and word processing systems, the report stated.

Although suitable for desktop computers, Venture sees the minifloppy being challenged by solid-state memories.

Double-density recording codes will be used on 75% of all drives shipped in 1981, the report said.

Dual-sided drives will constitute 40% of 1981 shipments and 35% of all diskette shipments in 1981 will be dual-sided, the firm added.

Minidiskettes should account for 10% of the total diskette market at that time.

IBM holds about one-third of the diskette market and Information Terminals Corp. leads the independents, Venture stated.

Soft sector drives will account for 65% of all drives shipped in 1981 compared with 45% in 1976, the report continued.

Small Systems Use Growing

The predominant market for floppy drives through 1977 will be the intelligent terminal, but in mid-1978 the small business system will become the major consumer, according to the study.

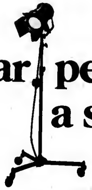
"The transition to small business systems will result from the upgrading of intelligent terminal capabilities to the point where they assume the status of small computers rather than from a collapse of the intelligent terminal market per se," Venture observed.

In a rough breakdown of markets, Venture shows data entry, microcomputers and word processing each consuming about 10,000 units during 1977.

Minis and larger computers together take about 20,000, while small business systems are charted at about 60,000 units in 1977. Intelligent terminals lead with around 90,000 units.

However, in 1981, small business systems will take about 190,000 drives, intelligent terminals 90,000, word processing and micros each about 70,000, followed by large computers and minis with 30,000 and data entry with scarcely more than its original 10,000.

The floppy disk drive study costs $950 from Venture Development at One Washington St., Wellesley, Mass. 02181.



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Telecommunications Market Seen Unique Area

CHICAGO — There are several factors that make telecommunications marketing unique, Harry Newton, an independent consultant, suggested to CCIA members here recently.

First, there are regulatory factors, such as the "alphabet soup" of government and semigovernment agencies and associations — Naruc, Usita, OTP, FCC, and state PUCs and PSCs.

In addition, there are the federal courts where everything of significance finally gets decided, Newton said, noting the decisions are made after much delay and usually in the regulatory agency's favor.

CW at CCIA

Dominance by one supplier is another important factor. AT&T has 930,000 employees and controls 85% of U.S. telephones. Long Lines controls 99% of all long-haul traffic and Western Electric had $7 billion in sales last year, Newton pointed out.

The product life cycle is also important.

Some end-users are writing off PABXs over five years (versus a tax rate of eight years) while earlier versions of Bell central office switches were written off over 40 years, Newton said. Bell equipment is still designed for life cycles and mean-time-between-failures longer than those of any other industry, he said.

This all means that market penetration can take much longer, requiring far greater start-up expenses.

Also, regulation can affect product life cycles, either speeding them up or slowing them down, he said, citing the Federal Communications Commission change to a 40-channel system, which destroyed the 23-channel CB market value.

There are also minimal OEM sales in the telecommunications industry since vertical integration has been the industry practice and standard in order to assure adequate supply and quality products, he said.

Customer psychology is not to be ignored, Newton suggested. There is almost no risktaking in the telecommunications industry, since communications managers cannot "bury" their mistakes.

"Ignorance is bliss in a static monopoly situation, but it is the enemy in today's competitive world," he said, adding that education should be a major part of any marketing effort in this area.

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Field Ripe for Mini Makers

(Continued from Page 37)

- Virtually all the leading independent telephone companies have moved into the interconnect industry, effectively legitimizing it.
- Many independent and some Bell companies are offering the same interconnect equipment interconnect companies are, further legitimizing the industry.
- The newer equipment is small, modular and compact, allowing ease of delivery and installation.
- A secondary market in used interconnect equipment has developed, thus assuring users of a market for equipment they outgrow.
- Bell's most recent prices for PABX and key set systems have been higher than its early dimension and Comkey pricing, thus providing an effective competitive pricing umbrella.
- Users no longer have to be sold on interconnect. If they haven't had first-hand experience, then someone in the same town or the same industry certainly has.
- Consultants are more and more comfortable with recommending interconnect.

This year, Newton forecast, the voice interconnect industry will show sales of $640 million, which includes $400 million for PABX systems, most of which are mini- or micro-controlled, and $15 million to $20 million for mini- or micro-controlled telephone management.

According to surveys Newton has done of the International Communications Association members, the largest communications users in the U.S., 42% say their 1977 bills will be up 10% (an estimate Newton considers very conservative); 83% billback expenses and 25% have billback "bitches." Of those interviewed, 43% did not have major interconnect systems. However, of the 57% who do, 65% are happy with interconnect, 71% are happy with specialized common carriers and 83% are planning more circuits.

Newton predicted that the threat of SBS taking over complete networks of Fortune 500 companies must prompt a new service offering by the Bell System which would provide detailed real-time information on network management and usage for both optimization and billback.

"Such a network will mean the use of data links from voice tandeming switches into a centralized mammoth computer which could be accessed by corporate communication managers," he predicted.

Dumb Terminal™ is a registered trademark of Lear Siegler, Inc.

To Avoid IBM Domain

Growth, Profit Goals Led Adds to OEM Market

By Toni Wiseman
CW Staff

HAUPPAUGE, N.Y. — When Applied Digital Data Systems, Inc. (Adds) went into business eight years ago, management set certain criteria for the company in terms of growth and profit.

To achieve these goals, it decided it had to start with a product that was not IBM-oriented and address a marketplace that was not IBM-dominated. It also decided to develop products with advanced features and become a leader in marketing them, while entering the market on a sales-only basis. This had to be the OEM marketplace, William J. Catacosinos, president and chairman of the board, told the New York Society of Security Analysts recently.

Taking these steps would allow Adds to build a strong company with a very strong capital base, he said. "We felt we had to have strong cash generation and we therefore established for ourselves certain profit goals. Our goal as we grow is to try to maintain profits between 30% and 40% before tax.

"We also believed we had to have an international presence and had to build our overseas business so that it represented 15% or 20% of our total revenues," Catacosinos said.

"We wanted a product that would not be susceptible to being folded into the IBM mainframes as the disk controllers were with the IBM 370 series of computers — a product that could take advantage of advances in solid-state technology and improve the performance-to-cost ratio over a period of time.

"And we wanted to be at the end of the telephone line where we could not be controlled or dominated by an IBM," he stated.

The end result of these deliberations has established Adds as one of the leading suppliers to the OEM Teletype-compatible marketplace.

Adds produces a wide range of products including the 520 and 580 series of desktop Consul terminals as well as the 920 and 980 Consul series.

The strategy would seem to have been successful. Adds revenues have grown from $1.7 million in 1972 to $23.4 million in 1976. Earnings have similarly grown from a loss of $52,303 in 1972 to earnings of $4.6 million in 1976.

Adds' customer base has also grown dramatically, from 212 in 1972 to over 1,000 last year, representing more than 32,000 installed units.

At the National Computer Conference last June, Adds introduced the first members of a new product line based on Intel's latest technology. The new devices, the Regent 100 and 200, will eventually replace the Consul 500 and 900 series, he said.

The Regent 300 is scheduled to be introduced this fall, the Regent 400 in early 1978 and the 500 and 600 shortly thereafter. "These will be user-programmable terminals.

Catacosinos does not subscribe to the theory that "it will be necessary to develop the tremendous processing capability at each of the sites as the proponents of distributed data processing would lead us to believe."

This view, he admitted, involves a risk for Adds. "But we believe it's a worthwhile risk because IBM will prevail in lowering data communications costs.

IBM Seen Potential Threat

(Continued from Page 37)

enter the general-purpose computer systems business with a line of products in 1972.

The Feb. 20, 1970 memos were circulated to B.O. Evans, who was president of IBM's Systems Development Division. J.G. Powers, director of financial analysis for the DP group was the author of the estimates that also went to R.A.Camuso, who became manager of financial analysis at the DP Division, and D.J. Perry, who became manager of financial analysis at the DP group.

Withington had estimated that the cost of entering the general-purpose system business with a line of products would be $300 million in 1972 and $400 million in 1977. The difference in price was split equally between inflation and the added cost of the broader product line that would be needed, he said.

IBM's estimates were $150 million to $500 million. Although the two estimates were on slightly different bases, several aspects were nearly identical.

They each assigned $50 million for plant and working capital.

Withington estimated $100 million for programming support and IBM allocated $90 million, but noted this could grow to $300 million.

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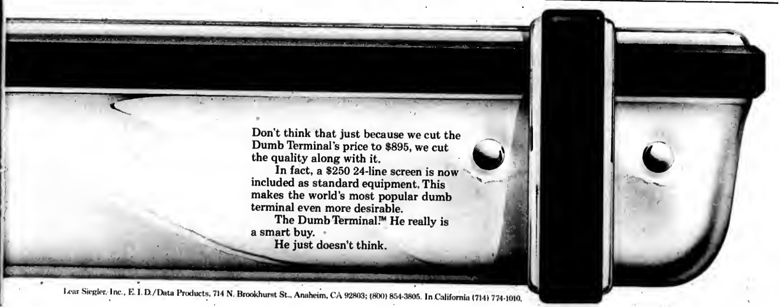

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Financial News

Analysts Bullish on DP Stocks Outlook for Year

By Molly Upton
CW Staff

NEW YORK — Computer industry stocks should continue to outperform the stock market for the rest of the year, according to investment analysts here.

They said the stocks have recently bounced back from a relatively low position after companies announced their recent quarter results.

The results show that margins weren't as adversely affected by IBM's recent pricing moves as people had anticipated, they indicated.

William Easterbrook of Kidder Peabody & Co., Inc. observed the stocks have recently had a "very nice move, and the move they will have in the next six months will be better than the market.

"The major reasons will be that earnings comparisons are going to be better in the second half than in the first, I think, and also there are increasing estimates of capital expenditures for this year and next year, which will favor the industry," he said.

In addition, the negativism among portfolio managers caused by IBM's pricing moves, which was reflected in the low stock prices, has been greatly dissipated, he stated.

"I think the second quarter results, the maintenance and in many cases the improvement in. margins, have been major factors as has been the order gains that many of the companies have shown in the second quarter," Easterbrook said.

James Blair, first vice-president of White Weld & Co., observed computer stocks recently have been "super." He indicated the stocks were probably depressed before because people were concerned that profit margins would erode as a result of the price cutting, but they didn't.

Blair's prognostication is that margins look pretty good, and foreign currency trends ought to help the margins a lot, also. He is "pretty optimistic" about the stocks and predicts they will outperform the market.

Harry Edelson of Drexel Burnham Lambert, Inc. indicated nearly all Wall Street analysts were surprised by the second quarter results, which were higher than had been predicted.

Even with the price performance offerings of the IBM 3033, the industry had an excellent quarter, he observed.

"The computer group is showing a lot of vitality and stock market interest has definitely picked up as a group and done much better than the averages."

DEC Revenues Increase 44% Over '76 Level

MAYNARD, Mass. — Digital Equipment Corp.'s fiscal 1977 revenues leaped 44% over 1976 revenues while earnings soared 48%.

Revenues for the year ended July 2 rose to $1.05 billion compared with $736.3 million a year ago.

Earnings for the period climbed to $108.5 million or $2.78 a share compared with $73.4 million or $1.98 a share in the year-ago period.

Fourth-quarter revenues gained 42%, rising to $330.3 million compared with $231.9 million in the 1976 period.

Earnings for the quarter rose to $41 million or $1.05 a share compared to $26.8 million or 70 cents a share in the year-ago quarter.

DEC attributed much of the strength in year-end results to a steady buildup in demand throughout all worldwide markets plus a sustained high order rate which began in fiscal year 1976. To meet the strong customer demand, DEC hired more than 11,000 people during the year.

During the year, DEC acquired or expanded 12 manufacturing plants representing more than 2 million square feet of additional space.These investments, which placed a high level of expense and cost burden on operations, enabled the company to shorten delivery times to customers.

In addition, the company introduced several major products, including the PDP-11/60 mid-range computer, the microprocessor-based PDP-8 and a PDP-11-based distributed plant management system for industrial customers.

Nickels & Dimes

Medical Computer Systems has received a cash offer of $7 a share for each of its 2.7 million outstanding shares from Dun & Bradstreet. Current market price for the stock is $4.75. The firm's board of directors has not yet made a recommendation on the matter.

$ $ $

Trading in **Wyly Corp.'s** securities has been halted pending announcement of a new recapitalization plan due Aug. 20.

$ $ $

Network Data Processing has declared a 4-cent divident payable Sept. 1 to holders of record Aug. 15.

$ $ $

National CSS has declared a quarterly dividend of 10 cents a share payable Sept. 1 to holders of record Aug. 15.

How to stretch your DP dollars without getting bent out of shape.

Read our special report on *Stretching the DP Dollar* in the September 26th *Computerworld.*

Working within the tight budget constraints that exist in most DP departments can start with something simple — like a thorough management review of the reports you produce. A few might be outmoded or unnecessary, and these could be eliminated. Others could be produced less frequently; and the reports you rely upon most might be combined. All of which saves not only computer time, but end user, managerial time as well.

There are literally hundreds of other ways to save money and aggravation in your DP operation. And we'll have several experienced people on hand to tell us how they found ways to maximize efficiency in their installations in our September 26th special report. Edited by Frank Vaughan, *Stretching the DP Dollar* will be filled with informative stories like these:

- Making your computer a profit center through timesharing - an applications story.
- Trade-Offs of using a service bureau versus an in-house system — a tutorial.
- Lease or purchase? — Caveats and benefits.
- Designing a computer facility — how it's built is almost as important as what's in it.
- Saving money in a university DP environment — a case study.
- How a municipal government and a state agency cut costs by sharing a system — an applications story.
- Saving money on computer room forms — a survey of innovative methods.

If you're a DP Manager, financial specialist or executive with a flair for doing more with less expense, our September 26th special report will have valuable and interesting information for you. If you market a product or service that helps people save on data processing costs, you should advertise here. Ad closing date is September 9. Get the details from your *Computerworld* salesman. Or call Terry Williams at (617) 965-5800.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Boston	New York	San Francisco	Los Angeles
Bob Ziegel	Don Fagan	Bill Healey	Bill Healey
Mike Burman	Frank Gallo	Jim Richardson	Jim Richardson
(617) 965-5800	(201) 461-2575	(415) 495-0990	(213) 475-8486

Contracts

Alanthus Data Communications Corp. has been awarded a three-year blanket purchase order contract to lease data communication terminals to Chrysler Corp.'s Service & Parts Division, Detroit, Mich.

Logicon, Inc. has received two contracts totaling $1 million from the Naval Sea Systems Command to expand its work in support of the Navy's Aegis ship combat direction system

Keane Associates, Inc. has received a five-year contract from Newton-Wellesley Hospital in Wellesley, Mass. to provide on-site DP management services.

Conrac Corp. has been awarded a contract by IBM's Federal Systems Division for the Strategic Air Command Communication Systems replaceable keyboard displays.

Collins Commercial Telecommunications Group of Rockwell International has received a five-year contract from Securities Industry Automation Corp. (Siac) for the upgrading and expansion of Siac's Rockwell-Collins front-end/message-switching system.

Distronics Corp. has received a contract from Huron Pipe & Supply Co. to automate business operations.

The Pertec Computer Corp. Service Division has received a two-year contract from Randal Data Systems, Inc. to provide field maintenance for Randal's business computer systems.

TRW, Inc. has received a contract from Pitney-Bowes to service customers of Pitney-Bowes' Spice retail terminal systems.

Recognition Equipment, Inc. has received a $1.7 million contract from the Federal Reserve System to build five high-speed Currency Verification, Counting and Sorting systems.

Executive Corner

- Mark McGrew has been promoted to president of Computer Power Systems Corp.
- George J. Vosatka has been named president of the Valcomp Division of Tymshare, Inc.
- Emmett W. Johnson was appointed vice-president, Navy Systems Division and John W. Vold was named vice-president of the International Systems Division within the Sperry Univac Defense Systems Division.
- Jerome J. Meyer has been named vice-president and general manager of Sperry Univac Minicomputer Operations and James B. Aldrich was named vice-president of airlines operations.
- Donald P. Moffet was named chief operating officer and executive vice-president of Sycor, Inc.
- M. Kenneth Oshman and E.E. van Bronkhorst have been elected to the Xebec Systems, Inc. board of directors.
- Dr. Peter McCuen has been named president and chief operating officer of Information Terminals Corp.
- Stephen E. Sargent has been appointed president of Continental Computer Leasing Corp. and Gordon D. Tracy has been appointed vice-president.
- Norbert Steinberger has been named acting president and chief excutive officer of Compuscan, Inc. after the resignation of Robert A. Leonard, who was chairman, president and a director.
- John E. Fox has become vice-president, marketing and Robert J. Perry has become vice-president, plans and controls at Satellite Business Systems.
- Charles D. Kempton has been appointed vice-president, western sales of Wang Laboratories, Inc.
- James V. Wilson has been elected assistant vice-president of C.T. Law Technology, Inc.
- Bobby R. Cabaniss has been appointed vice-president/product marketing for the Computer Products Division of Itel Corp.'s Data Products Group.
- Karl Brdlik has become vice-president and general manager of Comtech Small Business Systems Division.
- Waldo L. Landmeier has been promoted to the new position of vice-president of engineering for Talos Systems, Inc.
- Jack C. Davis has been appointed a corporate vice-president/group executive of Harris Corp.

Earnings Reports

MANUFACTURING DATA SYSTEMS
Three Months Ended May 31

	1977	1976
Shr Ernd	6.26	6.16
Revenue	9,370,000	4,583,000
Earnings	779,000	632,000
9 Mo Shr	.55	.46
Revenue	16,841,000	11,634,000
Earnings	1,660,000	1,267,000

MICRODATA
Three Months Ended May 31

	1977	1976
Shr Ernd	6.24	$.40
Revenue	9,032,000	9,506,000
Earnings	532,000	883,000
9 Mo Shr	.56	1.01
Revenue	27,235,000	19,585,000
Earnings	1,227,000	1,984,000

NATIONAL CSS
Three Months Ended May 31

	1977	1976
Shr Ernd	$.77	6.66
Revenue	11,574,000	10,154,000
Earnings	679,00	754,000

NATIONAL DATA
Year Ended May 31

	1977	1976
Shr Ernd	$.52	$.39
Revenue	34,966,000	32,946,000
Earnings	2,340,000	1,923,00
3 Mo Shr	.16	.12
Revenue	9,340,000	9,245,000
Earnings	973,000	679,00

NATIONAL SEMICONDUCTOR
Year Ended May 31

	1977	1976
Shr Ernd	$.76	$1.44
Revenue	397,336,000	325,097,000
Earnings	10,194,000	19,953,000
3 Mo Shr	.25	34
Revenue	96,272,000	96,166,000
Earnings	3,213,000	4,498,000

NUCLEAR DATA
Three Months Ended May 31

	1977	1976
Shr Ernd	$.58	$.31
Revenue	6,559,990	4,365,360
Tax Cred		147,000
Earnings	a633,598	249,463

a-Includes $175,000 after-tax additional gain on prior year sale of product line.

SYKES DATATRONICS
Three Months Ended May 31

	1977	1976
Shr Ernd	$.13	($.01)
Revenue	1,151,994	722,071
Earnings	141,160	(10,989)

TAB PRODUCTS
Year Ended May 31

	1977	1976
Shr Ernd	$2.74	$1.40
Revenue	50,280,000	37,699,000
Earnings	2,285,000	1,196,000
3 Mo Shr	.75	.57
Revenue	13,661,000	10,933,000
Earnings	638,000	474,000

APPLIED DIGITAL DATA
Three Months Ended May 31

	1977	1976
Shr Ernd	$.22	$.28
Revenue	7,819,011	5,412,511
Earnings	1,251,372	1,054,663
6 Mo Shr	.46	53
Revenue	13,197,255	10,412,611
Earnings	2,226,309	2,024,100

COMPUTER HORIZONS
Three Months Ended May 31

	1977	1976
Shr Ernd	$.09	$.09
Revenue	1,386,371	960,765
Earnings	60,165	62,171

COMPUTER INVESTORS GROUP
Year Ended March 31

	1977	1976
Shr Ernd		$.95
Revenue	$29,635,000	33,562,000
Tax Cred	132,000	91,000
Earnings	(1,941,000)	1,855,000

TEKTRONIX
Year Ended May 28

	1977	1976
Shr Ernd	$2.49	a$1.71
Revenue	454,958,000	366,546,000
Earnings	43,971,000	30,089,000
3 Mo Shr	.80	a.49
Revenue	125,308,000	95,731,000
Earnings	14,172,000	9,667,000

a-Adjusted for two-for-one stock split in May 1977.

position announcements | position announcements

POSITION ANNOUNCEMENTS

SYSTEMS PROGRAMMER

The University of Idaho announces an opening for a DP Software Specialist II, to participate in the expansion of our S370/145, OS/VS1 academic and administrative computer facility. The position, with starting salary of $14,796, includes excellent fringe benefits, a college atmosphere, and easy access to Northern Idaho recreational areas. Among the minimum qualifications are a bachelor's degree in a computer-related field and one year of systems programming experience. Send your resume by September 30, 1977 to Jeff Billin, Computer Services, University of Idaho, Moscow, ID 83843. An AA/EO employer and educational institution.

PROJECT MANAGER

N. Eng. Industrial seeks indiv to direct tech. staff in MVS implementation. Excell. FORTUNE 500 client offering growth oppty. Salary to $28,000. Contact Stan Durbes.

ROBERT HALF
PERSONNEL AGENCIES
111 Pearl St.
Hartford, Conn. 08103
(203) 278-7170

PROGRAMMER

The FIRST PEOPLE have an opening on the programming staff for an individual with 2 to 3 years in the data processing field with BAL experience and OS/VS1 exposure. Tele-processing knowledge would be advantageous.

We offer free checking, cafeteria facilities, excellent benefits and attractive starting salary.

SEND RESUME & APPLY
9 AM TO 4 PM
PERSONNEL DEPARTMENT
FIRST NATIONAL BANK
10th & Baltimore
Kansas City, Mo.
Equal Opportunity Employer

SENIOR SYSTEMS PROGRAMMER

Responsibilities will include systems programming support of OS MVT. The successful applicant will have at least 2 to 3 years experience in systems programming (OS or VS) and be familiar with the respective SYSGEN process, and a bachelors degree or equivalent combination of education and experience. A proven ability to lead others as a project manager is also highly desirable. Starting salary will be in the $16,000-$20,000 range, depending on qualifications. A full fringe-benefit package also applies, including 4 weeks of vacation.

The J. Preston Levis Regional Computer Center (JPLRCC) provides computing services for a number of users in Northwest Ohio, including Bowling Green State University, the City of Toledo, the University of Toledo, and the Toledo/Lucas County Criminal Justice Regional Planning Unit with IBM and Univac systems. RPLRCC is located south of Toledo in surburban Perrysburg in an area with a full range of cultural and recreational opportunities. Applicants should submit a complete resume, salary history and a list of references no later than September 9, 1977 to: Personnal Officer, JPLRCC, 25875 Dixie Hwy., Perrysburg, Ohio 43551. (JPLRCC is an EO/AA Employer)

PROGRAMMERS -- ANALYSTS

DASD Corporation, a national consulting firm specializing in Software Product development and Contract Services, is planning to increase its staff considerably during 1977. Positions are now open in the following areas:

- Project Management
- Project Leaders
- Senior Analysts
- Programmer/Analysts
- Programmers
- DATA BASE CONSULTANTS

We are looking for people with experience in any of the following categories:

COBOL
ALC/BAL
RPG II
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This is an excellent opportunity for the right individuals.

Benefits include Blue Cross Blue Shield Medical Ins., Life Ins., Disability Ins., Retirement Plan and an excellent salary.

We have offices in Milwaukee, Chicago, Houston, Los Angeles and Philadelphia. Expansion plans for other cities are also underway. We will relocate you to accommodate your career as well as DASD's plans.

Please call or send your resume to our Corporate Offices at

DASD CORPORATION
8705 North Port Washington Road, Suite 301
Milwaukee, Wisconsin 53217
(414) 351-2600

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M.I.S. INTERNATIONAL, INC. — an internationally-known computer systems integration organization — requires specialized professionals for top assignments in Michigan and Indiana.

Knowledge of the following computers is desirable:

- IBM/IMS Expert
- COBOL Programmers for IBM 360/370, Burroughs 4700, Honeywell 6000, Interdata
- MARK IV, Varian, Microdata Programmers
- Mini/Micro Programmers for CAI/LSI-2, ModComp, PDP-11 with RSX, TI 990-4

Computer Professionals interested in furthering their career should consider M.I.S.'s top salary structure, stable employment environment, fully-paid fringe benefits, educational opportunities, and relocation allowances. You are invited to send your resume to Mrs. M. Roseliep

M.I.S. INTERNATIONAL, INC.
31350 Smith Road
Romulus, Michigan 48174
(313) 326-7010

COMPUTER CENTER DIRECTOR

Clemson University is seeking a director for the Computer Center who is responsible for academic, administrative, and contract computing services. The director is responsible for the host computer facility (IBM 370/165-II under MVS) as well as local and remote terminal networks. The director will maintain computing facilities at a state-of-the-art level to support research and instructional needs as well as maintain maximum system availability for production support of statewide on-line systems. The director reviews and coordinates computer resource needs with two directors of application programming divisions which serve on-campus departments and off-campus agencies. He supervises managers of computer operations, software systems, hardware systems, and academic computing services. Minimum qualifications include five years experience in data processing management, design and operation of data base/data communication systems and management of teleprocessing networks. Masters degree in data processing related area required, Ph.D. preferred. Salary negotiable and commensurate with qualifications. Submit three letters of reference relevant to technical and management qualifications and complete resume to:

Search Committee, Computer Center Director, c/o Graduate School, E-109, Martin Hall, Clemson University.

Clemson, South Carolina 29531

Closing date for applications is October 31, 1877. Clemson University is an equal opportunity, affirmative action employer.

PROGRAMMER ANALYST

Corporate office of Rocky Mountain meat packer has a current opening for a programmer/analyst. We offer a challenging opportunity to an individual with a minimum of two years programming PDP 11/40 in BASIC + under RSTS/E. Degree in business or math preferred. Thorough knowledge of RSTS/E operating system, accounting systems and experience with a data base would be a plus. Send confidential resume to Personnel Dept., P.O. Box 16345, Denver, CO 80216

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BURROUGHS PROGRAMMER

The FIRST PEOPLE have an opening for an individual with 3-4 years experience in the data processing field with COBOL and Burroughs System exposure. Knowledge on IPS on medium systems is essential. Data Communications experience preferable.

We offer free checking, cafeteria facilities, excellent employee benefits and attractive salary.

SEND RESUME (with salary requirements) OR APPLY 9 AM TO 4 PM.

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SENIOR ELECTRONICS ENGINEER

BSEE with minimum 4 to 6 years' experience or equivalent in development of hardware systems using micro computers on discrete controllers Experience in areas such as disc controllers or other mass storage system controllers is preferable

SENIOR DESIGN ENGINEER - FIRMWARE

BSEE or BS in Computer Science with 2 to 3 years' experience in software development of real time mini-micro computer systems Experience with I/Q drivers for devices such as cassettes, magnetic tapes, floppy disks or disks is preferable

FIRMWARE ENGINEER - DIAGNOSTICS

Minimum 2 years' experience in hardware design, programming in assembly language of micro computers. Diagnostics programming a definite plus BSEE or equivalent desired.

SENIOR ENGINEER - ANALOG

BSEE a must, MSEE desirable Five years' experience in analog circuit design, preferably in magnetic recording and/or servo mechanisms.

SENIOR MECHANICAL ENGINEER

A BSME is required, MSME highly desirable, plus at least 7 years' experience in the design of products involving small, high reliability mechanisms, preferably in the printer field or related to computer peripherals. Your background should include leadership responsibility on development projects.

INDUSTRIAL ENGINEER

Minimum 2 years' experience with printed circuit board assembly methods a must, electro-mechanical assembly experience a definite plus; should be experienced in processing and standards. A degree in E E or equivalent experience is needed.

SYSTEMS PROGRAMMERS

Minimum two years' experience as a Systems Programmer in any of the following areas

- Data Communications
- Compiler and Languages
- Access Methods
- Data Base Management Systems

Experience in mini/micro computers with Assembler language is desired. BS in Computer Science or equivalent is a must MS is preferred

SYSTEMS ENGINEER

Experience as a Programmer in COBOL or Assembler required Micro/Mini and/or programmable (intelligent) terminal use or support experience desirable, plus exposure to data entry applications and marketing customer support Communications with bi-sync and on-line background especially helpful. Bachelor's degree desired

SALES REPRESENTATIVE

Minimum of 3 years' experience successfully selling terminals, peripherals, or small systems and general knowledge of DP applications, including communications is required. Candidates must have a proven track record of sales performance over quota. Responsibilities include sales of a complete line of computer products and support of existing customers.

If unable to see us during the WESCON show interviews, please send your resume in confidence to.

SYCOR, INC.
Gopi R Jindal, Ph D., Manager Corporate Employment & Staffing
100 Phoenix Drive Ann Arbor, Michigan 48104
(313) 995-1156

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RELOCATION AND EXCELLENT BENEFITS
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INFORMATION SYSTEMS DEPT.
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Glendale, CA. 91201
(213) 240-6400

BEKINS

The Bekins Company
Glendale, California
EOE

PROGRAMMER ANALYST

wanted to develop new applications programs for administrative offices at South Dakota School of Mines and Technology, Rapid City, South Dakota using a CDC 6400 operating under KRDNDS 2.1. This position is available under South Dakota's Career Services. Contact Director, Computation Center, South Dakota School of Mines & Technology (605) 394-2215. Closing date is September 19, 1977. SDSM&T is an equal opportunity employer.

FEE PAID LOCATIONS

near
Philadelphia, Chicago, Milwaukee
$13,000 to $22,000

Needed programmers, Programmer Analysts, Systems Analysts, Software Analysts.

If you have one of the following qualifications, minimum 2 years, COBOL or FORTRAN or ALC on 360/370 OS or DOS, please

Call or send resume
DATA PROCESSING DEPT.
PERSONNEL PLACEMENT
537 Huffman Mill Rd.
Burlington, N.C. 27215
(818) 584-5591

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Outstanding opportunity to join our progressive organization. These positions are available at the home office of BLUE CROSS BLUE SHIELD, near beautiful Chapel Hill, N.C. The successful candidates will have two to five years experience; exposure to on-line systems in an IMS data base environment a plus. We offer an excellent salary and benefit package. If you are interested in a career opportunity offering growth and a professional environment, please submit your resume to:

Personnel Mgr.
BC/BS of N.C.
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Durham, N.C. 27702

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computer hardware and software candidates...

RELAX

We have sources of openings in all parts of the U.S. Our fees are paid by hiring companies anxious to find qualified computer hardware and software candidates. Contact the nearest office for confidential service and let us do the footwork.

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5401 W. Kennedy Blvd., Suite 285
Tampa, Florida 33808
(813) 972-2831

COMPUTER CAREERS INC.
Specialists-Data Processing
4720 Montgomery Lane
Suite 503
Bethesda, MD. 20014
(301) 954-9229

WETERRINGS & AGNEW, INC.
425 Midtown Tower
Rochester, N.Y. 14804
(718) 454-3998

CAREER SPECIALISTS PERSONNEL SERVICES
4900 El Camino Real, Suite 209
Los Altos, Calif. 94022
(415) 941-3200

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1908 West End Building
Suite 121
Nashville, Tennessee 37203
(915) 328-1771

National Personnel Associates®

ASSISTANT TO THE DIRECTOR POLICY & PLANNING

The Berkeley campus of the University of California invites applications for this new position. As the principal assistant to the Director - Computing Affairs, this position aids in formulating campus computing policy and format plans, and in administering major information systems, instruction, and research computing activities. Develops and administers departmental budgetary and financial control systems. Applicants must have 8 years computing experience, including 3 years management, or staff to senior management, 2 years budgetary or accounting responsibility, policy and planning, and other broad computing experience. University experience most desirable. Salary range $23,500-$33,100. Apply by September 15 to:

Director, Computing Affairs
Box CA13-C
University of California
Berkeley, CA 94720
An Affirmative Action Employer

PROGRAMMER ANALYSTS
Electronic Commercial Business Systems

The expanding perimeters of UOP, Inc., resulting directly from a solid committment to diversification and innovative efforts in research and development, has opened exciting career opportunities for Programmer Analysts at the world headquarters located in the northwest suburbs of Chicago.

B.S. degree coupled with two to four years systems analysis and programming experience that includes: ANS and COBOL; a thorough knowledge of the use, application and operation of computer systems and the principles of system documentation and programming; and a good familiarity with accounting and statistical theories and methods. Working within the framework of a progressive IBM 370/159 environment, selected candidates will be involved in a challenging range of assignments in the design, programming, testing and installation of commercial business systems.

Excellent salary, full benefits and generous growth potential. For confidential consideration, send resume which must include salary requirements to:

Barbara Gardner
UOP, INC.
Ten UOP Plaza
Des Plaines, Illinois 60016
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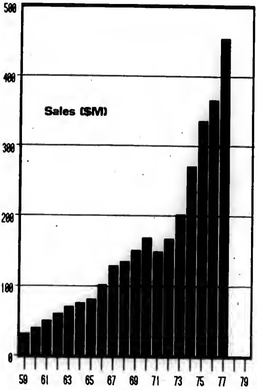

Marketing Product Managers

This continued corporate growth has created openings for product managers to market computer terminals and associated graphic products. Responsibilities include product planning, market introduction and penetration, administration of product programs and planning all aspects of product support.

Strong marketing and/or sales background in computing with emphasis on terminals and graphics is needed. Experience in hardware/software systems is desirable. Knowledge of the time sharing environment is a plus. Formal education might include a BSEE/CS and MBA in marketing.

Marketing Product Specialists

These individuals work directly with our customers and sales engineering providing technical support and applications assistance as well as participating in product planning and market development.

Your background in design or application of these products and experience in mini/micro computers, computer peripherals, graphics, time-sharing systems, ASSEMBLY and/or high level programming is desirable. Formal education might include a BSEE/CS and marketing courses.

Salary is open. Benefits include educational support, insurance and profit sharing programs. Tektronix, Inc., develops, manufactures and markets internationally recognized precision electronic measurement instruments, computer peripherals and related electronic instrumentation.

Send detailed resume and salary history to Roy Epperson, TEKTRONIX, INC., P.O. Box 500, C38, Beaverton, OR 97077.

An Equal Opportunity Employer M/F/H.

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COMMITTED TO EXCELLENCE

DATA PROCESSING PROFESSIONALS

Federated Department Stores, a national leader in retailing, is currently in the midst of a major systems development program utilizing the most advanced systems techniques and software available in today's market. The end result will be one of the most highly sophisticated data processing shops in the nation. The program is in full swing and growing rapidly, with many ground floor opportunities still available in a variety of areas.

Programmer Analysts

Qualified individuals will have at least two years of COBOL programming experience (any type of hardware) along with system design ability. Any familiarity with IMS, TSO, or structured programming techniques would be a definite plus.

System Analysts

Qualified individuals will be "take charge" type of people with at least four years of systems design and programming experience. Special consideration will be given to those applicants familiar with Retail applications as well as those familiar with general accounting systems.

Data Base Analysts

Qualified individuals will have at least three years of systems and programming experience with at least one year of experience designing, programming and implementing systems under IMS. COBOL expertise would be helpful as well as an understanding of IMS internals.

These positions offer excellent starting salaries, a liberal benefits package, and a challenging opportunity to play a key role in a multi-divisional systems development effort.

Interested? Then send us your resume or other experience summary today!

Mr. Frank McKain
Systems Research & Development, Room C-829
Federated Department Stores, Inc.
222 W. 7th St. Cincinnati, Ohio 45202
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PROGRAMMERS PROGRAMMER/ ANALYSTS

Let us offer you our professional expertise in finding the "right" position and company. Our individualized search will provide you with local and national exposure depending on your geographical preference. If you have at least 2 years experience in programming, send your updated resume, geographical preference, and salary requirements in strictest confidence to:

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Suite 25
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Cincinnati, Ohio 45208

COMPUTER PRO

If you are a professional and have the "state of the art" data skill, we want to talk to you. The market is right, all we need is you! Below is a sample of some of the positions available.

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Chicago Asst Mgr.	25-28K
P.A. Fin Systs	19-25K
Wisc Sr Syst	22-24K
Calif. Mgr Sys	25-28K
Fla. OS Software	20-22K
Chicago Software	23-25K
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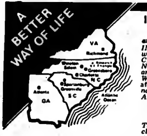
PROGRAMMER/ ANALYSTS

Dillard Department Stores, Inc. is the Southwest's leading retailer in the area of data processing, using an IBM 370/158 and the most progressive, on-line software tools. We are seeking programmer/analysts with experience in an OS environment. In depth knowledge of Cobol and/or BAL is essential. Experience with CICS, DL/I, and the retailing environment would be highly desirable. Applicants should have the potential to develop systems from the design through implementation stages. Salary commensurate with experience. Send resume in confidence to:

**Dillard Department Stores, Inc.
P.O. Box 486
Little Rock, Arkansas 72203
Attn: Ms. Karen Cobb**

Equal Opportunity Employer M/F



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Systems Programmer to $24K
Performance monitoring & conversion to MVS. Exp. in IBM 370 MVT, SVS or MVS; OS; CPE desired.

Telecommunications to $24K
Knowledge of TSO; RJE & Data Communications Techniques; IMS; Queing Theory; Recovery & Restart.

Technical Analyst to $22K
Strong exp. in applications coding & JCL. Provide interface between applications & software groups in 370; MVS; IMS environment.

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New systems development for Fortune 500 mfr. co. Min. 5 yrs. sys. design & prog. exp. 50% travel.

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For confidential interview, contact Joe Halow, Farah Manufacturing Co., Inc., P.O. Box 9519, El Paso, Texas 79985 (915) 593-4457.

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TEXAS

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Our service areas include: utilities, oil and gas, manufacturing, automotive, retail and financial institutions. Many of these areas utilize on-line data processing, structured design and programming, CICS, IMS, IDS, VSAM, MARK IV, PANVALET, FORTE II, DMS II and NDL.

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(313) 642-2900**

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(213) 370-7538

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Position requires 3-5 years experience as EDP examiner, preferably related to financial institutions.

Excellent total benefits package and advancement opportunities.

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Computer Science graduate and/or 2 years experience to work on development and support of compilers and operating system utilities/services for new state-of-the-art general purpose computer. Must have Assembler experience, knowledge of BASIC and/or COBOL is a plus.

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Needed: creative, dedicated personnel with 4-18 years experience, to join a special group of professionals developing systems software for WANG's minicomputer systems. Projects include file management, database management, language translators, data entry, peripheral support utilities, programming aids, etc. We are seeking experienced, self-motivated individuals preferably in systems level software. MS degree preferred, BS degree required. Salary commensurate with experience.

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Successful candidates will have a minimum of 2 years experience and Honeywell 6000/COBOL.

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PIERCE COUNTY
PERSONNEL DEPARTMENT
JOB ANNOUNCEMENT

SOFTWARE SPECIALIST

SALARY: OPEN

Pierce County announces an employment opportunity for a Software Specialist for the Law Enforcement Support Agency (LESA).

NATURE OF WORK:
This is a two year contract to transfer and integrate an incident tracking system with an existing CAD system and develop additional on-line and batch application programs. One programmer will be provided for assistance. Equipment used will be a PDP 11/60 mini-computer with PDP 11/40 backup.

MANDATORY QUALIFICATIONS:
Expert knowledge of PDP 11 mini-computer;
Expert knowledge of MACRO programming (preferably of operating systems as well as application programs);
Ability to assume project leader role in law enforcement environment.

DESIRABLE QUALIFICATIONS:
Knowledge of software for message switching, computer-aided dispatch and/or incident tracking systems.

NECESSARY SPECIAL QUALIFICATIONS:
Must be available to begin work no later than October 1, 1977.

Submit Resumes To:
Pierce County
Personnel Department
Room B-44
County-City Building
Tacoma, WA 984d2
(2d6) 593-4460
Closing Date:
August 31, 1977-4:30 P.M.
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Programmer/Analyst 370/OS JCL and COBOL experience	To 20K
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Position requires experience with NCR - Criterion or Century System. Applicant must be experienced in Neat/3-Level 2 and on line programming. Experience with B-3 Multi-Programming Executive will be a plus. We are a rapid growth company and offer excellent salary and fringe benefits. Paid relocation. Send resume with salary history and requirements to:

Data Processing Manager
Haworth Office Interior Systems
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Holland, MI 49423

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PLANNING RESEARCH CORPORATION has immediate openings for experienced DEC PDP-11 Systems professionals. Work will involve the development and installation of sophisticated mini computer operating systems and communications software packages for state-side and international clients. If you are experienced in the PDP 11 and would like to work state-side or outside the United States, we would like to talk to you. Salary for these positions range from $16-30K, excellent fringe benefit package including 3 weeks' vacation and dental insurance. Send resume and salary requirements to:

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Experience in assembler and/or COBOL language is essential. Candidates with on-line real-time experience in a banking or savings and loan environment are of particular interest. Send your resume and salary history to:

NCR

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Minimum of 4 years of progressive supervisory or project management background. Specific experience with IBM VTAM/NCP or TCAM/NCP. Responsible for developing a staff, providing technical leadership and supervision.

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PROGRAMMER ANALYSTS/SR. PROGRAMMER ANALYST

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DATA ANALYSIS DIVISION CHIEF

Needed to manage Data Processing Division. Duties include managing automated data processing operations and systems analysis, including monitoring and maintaining comprehensive municipal applications; interpreting data processing service capabilities and coordinating program development; plus, supervise a staff of professional, technical and clerical personnel. Requires BA/BS and 4 yrs. systems analysis and teleprocessing exp. Prefer local government and supervisory exp. Salary commensurated with training/experience.

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Needed by local County govt. to develop, install and maintain systems related to IBM 370 COS/VS environment using CICS/VS. Requires HSG or equivalent supplemented by standard programming courses plus 3 yrs. programming experience using ALC, COBOL and RPG; 6 months of which must be as systems programmer with virtual storage/teleprocessing operating systems and file maintenance software. Entrance salary commensurated with education/experience.

All resumes must be accompanied by a completed Co. app. and received by Sept. 7, 1977. Apply to

Arlington County Personnel Dept.
2100 N. 14th St.
Arl., Va. 22201
Affirmative Action Employer

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Basic responsibility: To direct all services provided to SWORCC users who are not a part of the University of Cincinnati. These services include the development, programming and implementation of computer systems, training programs about computers and computer systems, data reduction, data entry, operation of remote facilities, central computer services, courier services, word processing services, and any other service provided. To produce and/or provide income from such services that will be beneficial to the department and the university as a whole.

Qualifications: A master's degree or equivalent combination of education and experience. Extensive experience in systems analysis, computer systems development, and computer programming in the scientific and business applications for a variety of users. Extensive experience in data processing management including large project management. Some experience in contract administration.

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Services Division

Basic responsibility: To direct all SWORCC computer services provided to the University of Cincinnati departments. These services inlude the development of programming and implementation of computer systems, data reduction, data entry, operation of remote facilities, courier services, word processing services, training programs about computers and computer systems, and any other service provided.

Qualifications: A master's degree or equivalent combination of education and experience. Extensive experience in systems analysis, computer systems development and computer programming in both scientific and business applications for a variety of users. Extensive experience in data processing management including large project management. Some experience in higher education.

Immediate openings for PROGRAMMERS, PROGRAMMER ANALYSTS, SENIOR PROGRAMMER ANALYSTS and SYSTEMS ANALYSTS.

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Send resumes with current salary to Harold Crane, Personnel Manager, SWORCC, 3333 Vine St.,Cincinnati, Ohio 45220. Phone (513) 475-2135

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- **Product related Technical presentations**
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- **Product related Competitive Market Analysis**
- **Generation of proposals and price quotations**
- **Research of and Response to technical questions**
- **Various other duties as assigned by management.**

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For the qualified data communications professional who is seeking a challenging position as a Marketing Support Analyst with a dynamic leader in the field of Data Communications, COMTEN offers an attractive salary and benefit package.

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- **SOFTWARE DEVELOPMENT**
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Employees will enjoy excellent salary and top working conditions with a commercial employer Fully paid life hospital and medical plan for employees and dependents, generous relocation allowance

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NCR DATA PROCESSING DIVISION
16575 W Bernardo Drive, San Diego, Calif 92127
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LEAD PROGRAMMER

Well-established national corporation has a career opportunity in its Cincinnati-based headquarters for a highly-motivated, self-starting LEAD PROGRAMMER. Must possess proficient technical and supervisory skills to direct and develop other programmers. Solid experience mandatory in on-line systems and a data base environment such as: TOTAL, IOS, IOMS, OMS II, or OL/I. COBOL primary language; some PL/1 useful. College degree preferred. We offer an outstanding company-paid benefit package and excellent compensation. If qualified, call Ms. Hyland at (513) 621-6770 or forward resume to her attention at The David J. Joseph Company, P.O. Box 1078, Cincinnati, OH 45201.

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for internal time share user support group located in White Plains, N.Y.

Requirements:

- 4 year college degree
- min 2 years work experience
- exper in GE or NCSS time share systems
- knowledge of COBOL, FORTRAN, or PL/I

Desirable:

- experience in time share support or training
- experience with RAMIS, STATLIB

Send resume and salary requirements to:

Management Employment Supv.
AT&T LONG LINES
400 Hamilton Ave., Rm. 1008
White Plains, N.Y. 10601

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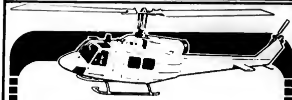

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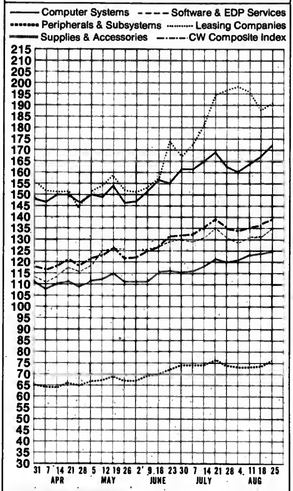

Earnings Reports

DATAMEDIA
Year Ended April 30

	1977	1976
Shr Ernd	$1.01	$.56
Revenue	6,060,763	2,868,664
Earnings	624,769	342,561

DATARAM
Year Ended April 30

	1977	1976
Shr Ernd	$2.30	$.03
Revenue	10,747,620	4,693,974
Tax Cred	213,750	.....
Earnings	1,168,761	15,386

DECISION DATA COMPUTER
Three Months Ended May 28

	1977	1976
Shr Ernd	$.08	$.01
Revenue	8,522,000	8,093,000
Tax Cred	82,000	.....
Earnings	282,000	29,000
6 Mo Shr	.14	.....
Revenue	16,413,000	16,621,000
Tax Cred	240,000	.....
Earnings	517,000	(592,000)

GRI
Three Months Ended May 14

	1977	1976
Revenue	$11,060,000	$16,602,000
Loss	132,000	76,000
6 Mo Rev	19,170,000	27,145,000
Loss	468,000	57,000

GENERAL INSTRUMENT
Three Months Ended May 29

	1977	1976
Shr Ernd	$.59	.....
Revenue	124,126,559	$107,196,283
Earnings	5,137,323	3,216,408

INCOTERM
Three Months Ended May 26

	1977	1976
Shr Ernd	$.31	$.16
Revenue	11,586,000	8,246,000
Earnings	818,000	356,000

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, AUGUST 24, 1977

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

EXCH		PRICE 1977 RANGE (1)	CLOSE AUG 24 1977	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
O	AMDAHL CORP	22- 44	43 1/2	+6 1/4	+16.7
N	BURROUGHS CORP	55- 91	70 5/8	-1 1/8	-1.5
O	COMPUTER AUTOMATION	18- 30	27 7/8	-1 3/4	-5.9
N	CONTROL DATA CORP	20- 26	20 3/4	- 1/8	-0.5
N	DATA GENERAL CORP	35- 51	49	- 1/4	-0.5
N	DATAPOINT CORP	18- 30	28 5/8	- 3/4	-2.5
N	DIGITAL EQUIPMENT	37- 53	46 1/8	-1 3/8	-2.7
N	ELECTRONIC ASSOC.	2- 3	1 7/8	0	0.0
A	ELECTRONIC ENGINEER.	8- 10	9 1/2	+ 7/8	+10.1
O	FOUR-PHASE SYSTEMS	13- 18	17 3/8	+1 3/4	+11.1
N	FOXBORO	42- 54	48 1/2	+1	+2.1
O	GENERAL AUTOMATION	6- 9	7 1/4	+ 3/8	+5.4
C	GRI COMPUTER CORP	1- 1	1/2	0	0.0
M	HEWLETT-PACKARD CO	69- 87	78 3/4	-5 1/4	-6.2
N	HONEYWELL INC	44- 55	49 3/4	-1 3/4	-3.3
N	IBM	245-286	268	- 3/4	-0.2
O	MANAGEMENT ASSIST	5- 9	6 1/2	- 7/8	-11.8
C	MEMOREX	23- 33	33 3/8	+4 3/8	+15.0
O	MICRODATA CORP	7- 18	11 7/8	+1 1/8	+10.4
O	MODULAR COMPUTER SYS	5- 8	8	+1	+14.2
N	NCR	32- 47	44 7/8	-1	-2.1
O	PRIME COMPUTER INC	12- 20	19 1/2	+1 1/2	+8.3
N	PERKIN-ELMER	17- 22	20 1/8	- 3/4	-3.5
N	RAYTHEON CO	16- 33	28 1/4	0	0.0
N	SPERRY RAND	34- 42	36 5/8	- 1/8	-0.3
C	SYCOR INC	8- 15	10 1/4	+ 1/2	+5.1
A	SYSTEMS ENG. LABS	5- 8	7 1/4	+ 5/8	+9.4
N	VARIAN ASSOCIATES	15- 21	18 1/8	+ 7/8	+5.0
A	WANG LABS.	10- 21	14 1/4	+1 3/4	+14.0
	LEASING COMPANIES				
O	BOOTHE COURIER CORP	8- 10	11	+ 3/8	+3.5
O	CCNOISCO INC	10- 13	11	0	0.0
A	COMMERCE GROUP CORP	2- 2	1 7/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	3/4	0	0.0
P	DATRONIC RENTAL	1- 2	1 1/8	0	0.0
A	DCL INC	1- 2	2 1/8	+ 1/8	+6.2
N	DRF INC	6- 9	7 7/8	0	0.0
N	ITEL	13- 21	20 7/8	+1 7/8	+9.8
M	LEASCO CORP	19- 27	25 3/8	+1 1/8	+4.6
O	LEASPAC CORP	1- 2	1	0	0.0
C	NRG INC	1- 1	1/8	0	0.0
A	PIONEER TEX CORP	5- 11	5 3/4	0	0.0
N	U.S. LEASING	10- 15	14 1/8	+ 1/8	+0.8

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

	PRICE 1977 RANGE (1)	CLOSE AUG 24 1977	WEEK NET CHNGE	WEEK PCT CHNGE
SOFTWARE & EDP SERVICES				
ADVANCED COMP TECN	1- 2	7/8	0	0.0
ANACOMP INC	7- 10	8 7/8	- 1/2	-5.3
APPLIED DATA RES.	5- 10	8 3/4	+1 1/8	+14.7
AUTOMATIC DATA PROC	23- 30	28 1/4	-2 1/8	-6.9
COLEMAN AMERICAN COS	2- 2	2	0	0.0
COMPU-SERV NETWORK	10- 15	12	0	0.0
COMP ELECTION SYSTMS	8- 10	9 5/8	+ 1/4	+2.6
COMPUTER HORIZONS	1- 1	1 1/4	0	0.0
COMPUTER NETWORK	8- 10	9	+ 1/8	+1.4
COMPUTER SCIENCES	7- 9	8 3/4	+ 3/8	+4.4
COMPUTER TASK GROUP	1- 2	2	+ 1/4	+14.2
COMPUTER USAGE	1- 3	1 1/2	0	0.0
COMSHARE	5- 7	6	0	0.0
DATA DIMENSIONS INC	3- 5	3 3/8	+ 1/4	+8.0
DATATAB	1- 2	1 3/4	0	0.0
ELECTRONIC DATA SYS.	16- 20	17 5/8	- 3/8	-2.0
INSYTE CORP	2- 3	1 5/8	- 1/8	-7.1
IPS COMPUTER MARKET.	1- 2	1 1/2	0	0.0
KEANE ASSOCIATES	3- 4	3 3/4	0	0.0
KEYDATA CORP	2- 3	1 5/8	0	0.0
LOGICON	7- 17	13 1/4	+ 3/4	+6.0
MANAGEMENT DATA	1- 2	1 5/8	- 1/8	-7.1
NATIONAL CSS INC	19- 26	25 1/4	+1	+4.1
NATIONAL DATA CORP	4- 7	5 1/2	- 1/8	-2.2
ON LINE SYSTEMS INC	17- 22	18 1/4	+1 1/4	+7.3
PLANNING RESEARCH	3- 6	5	+ 1/8	+2.5
PROGRAMMING & SYS	1- 1	1/2	0	0.0
RAPIDATA INC	2- 3	2 3/4	0	0.0
REYNOLDS & REYNOLDS	17- 20	18 1/4	+ 1/4	+1.3
SCIENTIFIC COMPUTERS	1- 3	3 5/8	+ 1/2	+16.0
TYMSHARE INC	14- 23	21 7/8	+ 7/8	+4.1
URS SYSTEMS	4- 5	4 1/4	- 1/8	-2.8
WYLY CORP	1- 2	1 1/4	0	0.0
PERIPHERALS & SUBSYSTEMS				
ADDRESSOGRAPH-MULT	10- 15	13 7/8	+ 7/8	+6.7
ADVANCED MEMORY SYS	7- 9	7 1/2	- 1/8	-1.6
AMPEX CORP	8- 11	10 1/8	- 1/4	-2.4
ANDERSON JACOBSON	3- 5	4	+ 1/8	+3.2
APPLIED DIG DATA SYS	10- 20	19 1/8	+2	+11.6
BEEHIVE INT'L	8- 12	9 7/8	+ 3/8	+3.9
BOLT,BERANEK & NEW	7- 8	7 3/8	- 5/8	-7.8
BUNKER-RAMO	8- 12	11 1/4	- 3/8	-3.2
CALCOMP	3- 5	2 7/8	- 1/8	-4.1
CAMBRIDGE MEMORIES	1- 3	2 3/8	+	+2.6
CENTRONICS DATA COMP	22- 30	28 7/8	- 3/8	-1.2
COGNITRONICS	1- 1	5/8	+ 1/8	+25.0
COMPUTER COMMUN.	5- 6	6 1/2	- 1/8	-1.8
COMPUTER CONSOLES	4- 7	4 1/4	0	0.0
COMPUTER EQUIPMENT	2- 3	3 1/8	+ 1/4	+8.6
COMPUTER TRANSCEIVER	1- 1	1 1/4	+ 1/8	+11.1
COMTEN	9- 13	10 1/8	+ 1/4	+2.5
CONRAC CORP	19- 26	22	- 1/2	-2.2

EXCH		PRICE 1977 RANGE (1)	CLOSE AUG 24 1977	WEEK NET CHNGE	WEEK PCT CHNGE
O	DATA ACCESS SYSTEMS	4- 5	3 3/4	0	0.0
O	DATA 100	6- 8	7 1/2	- 1/4	-3.2
A	DATA PRODUCTS CORP	9- 16	14 5/8	0	0.0
O	DATA TECHNOLOGY	3- 4	4 1/4	+ 1/4	+6.2
O	DATUM INC	1- 2	1 1/2	- 1/4	-14.2
O	DECISION DATA COMPUT	2- 3	2 1/4	+ 1/8	+5.8
O	DELTA DATA SYSTEMS	1- 1	3/8	+ 1/8	+50.0
N	ELECTRONIC M & M	4- 5	4 1/8	+ 1/8	+3.1
O	FABRI-TEK	1- 2	1 1/8	+ 1/8	+12.5
O	GENERAL COMPUTER SYS	0- 2	1 1/4	0	0.0
N	HAZELTINE CORP	9- 12	8 3/4	0	0.0
M	HARRIS CORP	28- 39	35 3/4	+ 7/8	+2.5
A	INCOTERM CORP	10- 15	11 3/8	+ 7/8	+8.3
O	INFOREX INC	4- 7	4 1/2	- 1/4	-5.2
O	INFORMATICS INTL INC	9- 14	10 1/4	+ 1/4	+2.5
O	INTEL CORP	38- 57	46 1/2	-3 1/2	-7.0
A	LUNDY ELECTRONICS	3- 4	4 3/8	+ 1/8	+2.9
C	MSI DATA CORP	6- 12	10 3/4	- 5/8	-5.4
N	MOHAWK DATA SCI	5- 8	6 1/2	+ 1/2	+8.3
O	PERTEC CORP	2- 5	3 3/4	0	0.0
A	PLATEC CORP	7- 9	8	- 1/8	-1.5
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	2- 2	1 1/2	0	0.0
O	QUANTOR CORP	4- 5	3 3/4	- 1/8	-3.2
O	RECOGNITION EQUIP	6- 10	7 1/2	- 1/2	-6.2
O	SCAN DATA	1- 2	1 3/8	0	0.0
O	STORAGE TECHNOLOGY	10- 16	15 1/2	- 1/4	-1.5
O	T BAR INC	7- 12	11 3/4	- 1/4	-2.0
O	TALLY CORP.	4- 4	4 7/8	+1	+25.8
A	TEC INC	7- 10	8	+ 3/4	+10.3
N	TEKTRONIX INC	29- 38	37	+ 1/2	+1.3
N	TELEX	2- 3	2 5/8	0	0.0
O	WILTEK INC	1- 1	3/4	0	0.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	2- 4	1 7/8	0	0.0
A	BARRY WRIGHT	10- 14	14 1/4	+ 3/4	+5.5
O	CYBERMATICS INC	1- 1	1 1/4	+ 1/8	+11.1
O	DUPLEX PRODUCTS INC	14- 19	17 1/2	+ 1/8	+0.7
N	ENNIS BUS. FORMS	6- 7	6	- 1/8	-2.0
O	GRAHAM MAGNETICS	11- 16	16 1/4	- 1/8	-0.7
P	GRAPHIC CONTROLS	15- 18	16	0	0.0
N	3M COMPANY	48- 56	51 1/2	+ 3/8	+0.7
C	MOORE CORP LTD	26- 37	27 1/2	+ 3/4	+2.8
N	NASHUA CORP	16- 26	25 1/2	+1	+4.0
O	STANDARD REGISTER	18- 25	21 1/2	0	0.0
O	TAB PRODUCTS CO	13- 19	17 1/4	- 1/4	-1.4
N	UARCO	19- 22	19 3/8	-1 1/8	-5.4
A	WABASH MAGNETICS	10- 15	12 1/8	- 3/8	-3.0
N	WALLACE BUS FORMS	17- 21	18 3/8	- 1/8	-0.6

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